the OIL AND GAS JOURNAL
PUBLISHED WEEKLY AUGUST 7, 1961

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Where Russia's Gas Industry is Headed

. . . First of a series of exclusive reports by William R. Connole, former FPC commissioner and a member of the gas-industry delegation to the Soviet Union.

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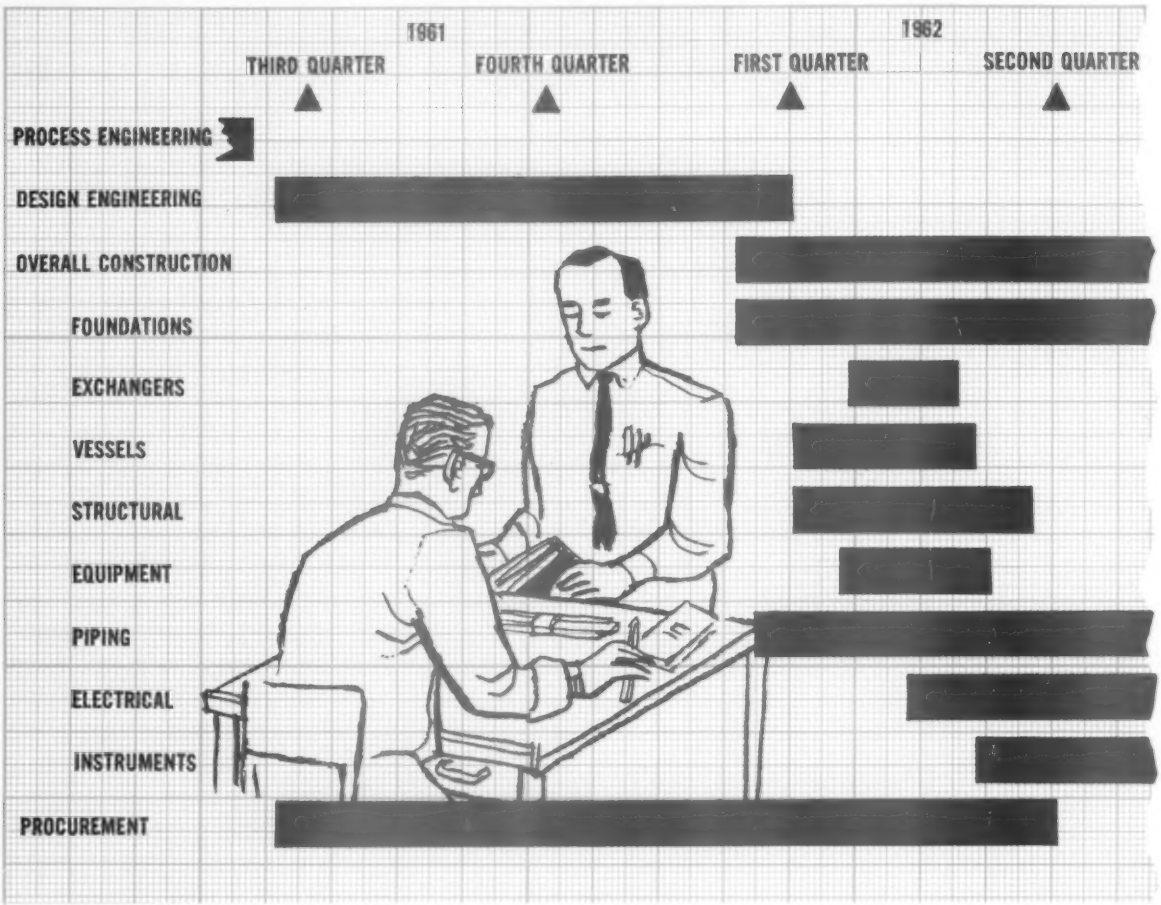

Progress Continues at Kellogg on Monsanto's New Phenol-from-Cumene Plant

The largest phenol-from-cumene plant in the United States is now in the mechanical engineering stage at Kellogg's New York Offices. Designed to produce 75 million pounds per year of high purity phenol, plus large quantities of acetone, the plant will be built at Chocolate Bayou, Texas, for Monsanto Chemical Company.

Full responsibility for engineering, procurement, and construction has been assigned to The M. W. Kellogg Company. A major portion of the process design is based on information licensed from Hercules Powder Company.

Feeds to the cumene section will be benzene and propylene; both will be produced by Monsanto at Chocolate Bayou. Feeds to the phenol section will be cumene and air. The entire project, part of the huge multi-million-dollar chemical complex Monsanto is building at Chocolate Bayou, is scheduled for completion in the summer of 1962.

Kellogg-Monsanto teamwork at Chocolate Bayou is another example of Kellogg's active participation in helping chemical, petrochemical and refining companies achieve their broad investment goals. To obtain information on how the Kellogg organization can translate your new-plant investment into the finished plant, you are cordially invited to contact The M. W. Kellogg Company.

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TECHNOLOGY—OPERATION

Refining-Processing

Hot Carbonate Solutions Withstand H_2S **109**

By R. N. Tennyson

Even after prolonged use with a high ratio of CO_2 and H_2S in the feed, solution will not deteriorate in gas-treating service. High absorption efficiency and capacity were maintained through a 25-day run.

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By Roy R. Wilson

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Drilling-Production

Good Drilling Practices Cut Costs in Alberta Foothills **104**

By J. J. Sullivan

Most important changes include: (1) Packed-hole drilling, (2) relaxed deviation limits, (3) low-weight, low-solids muds, and (4) air and gas drilling.

Oil-Well Pumping—51 ..... **126**

By Joseph Zaba

More on submerged electric centrifugal pumps.

Two Water Floods That Really Worked **136**

By W. Ray Staples

Success in water flooding depends on injection-water efficiency. In these two Indiana floods, maximum or near-maximum efficiency was realized. Recovery due to water flooding will reach 2.5 times that under primary operation.

IOCC Completes New Gas Manual **144**

Pipelining

Running-Type Meter Provers are Fast, Flexible, Simple **121**

By H. C. Bozeman

Wide acceptance of running-type meter proving will increase meter use for custody transfer because it's more efficient, costs less, and is faster method than volumetric prover tanks.

River Crossing Jetted in 1½ Hours **147**

By J. P. O'Donnell

An 8-in. gas line has been laid across the 600-ft.-wide Cimarron River in an hour and a half at 40% of the budgeted cost. This feat was performed by a jet trencher which digs the trench and lays the pipe simultaneously.

THE OIL AND GAS JOURNAL **Newsletter**

August 7, 1961

Significant this week

First-half earnings of the oil industry were good.

Most big companies chalked up profit gains, and a few records were set.

Some figures: First 21 major integrated companies to report on the half had total earnings of $1,437,885,000. That's 13.2% higher than their total for first half of 1960.

Increases in production and sales are credited with sparking the climb.

Caution is being expressed about second half. Executives of major companies say price fluctuations and other factors could cause setbacks (p. 75).

First big court test of crude-import program is under way.

Jersey Standard has filed a suit which challenges legality of sliding-scale formula for oil-import quotas in Districts 1-4.

In another attack on Interior Department's handling of controls, Sinclair has told Oil Import Appeals Board that it is suffering undue economic hardship—caused largely by granting of quotas to inland refiners (p. 78).

At this stage of the cold war, economic controls could be just over the horizon.

Clyde La Motte, the Journal's Washington editor, says the oil industry and others may have to live with this possibility for a long time.

If and when controls are deemed necessary, government agencies—led by OCDM—will be ready. Blueprints already have been drawn (p. 84).

More pollution charges may be flung against operators in West Texas' huge Spraberry field.

Reagan County officials have already petitioned Texas Railroad Commission to bar unlined brine-disposal pits in their area. And there's speculation that other counties will file complaints before long (p. 93).

Concrete barges are gaining in popularity in the shallow waters of South Louisiana.

Several majors and independents are using them for production and storage. Makers of the concrete structures claim quite a few advantages over pile-driven platforms and steel barges (p. 79).

Alberta's new Rimbey gas-processing plant boasts a number of firsts.

For example: With daily capacity of 326 million cubic feet, it ranks first in size among Canadian gas-processing installations.

And the big plant, owned by 27 companies which have interests in Westerose South (Dick Lake) gas field and Homeglen-Rimbey gas-and-oil field, is Canada's first large facility of its kind to use outdoor-type construction (p. 88).

Drilling ship able to make more than 15,000 ft. of hole in any depth of water is going into service next year.

It's Global Marine Exploration's CUSS II, now under construction in New Orleans. New vessel is specially designed for offshore drilling. Its sister ship, CUSS I of Mohole Project fame, is a converted Navy freighter.

CUSS II's first assignment will be in Gulf Coast waters (p. 89).

Better techniques are lowering drilling costs in Foothills belt of western Canada.

Area's biggest problem: Crooked hole, caused by steeply dipping beds associated with complex folds and numerous faults in shallower sediments. Important changes in methods include packed-hole drilling, relaxed deviation limits, wider use of air and gas drilling (p. 104).

Wildcatter interest in Paradox basin is running high.

Four fields have been found in the basin since start of 1961. Latest is Pure Oil's Big Indian-USA. It lies 2½ miles northeast of Lisbon field, biggest headliner in exploration last year.

Pure's strike is significant, but it may be outclassed by successes among 12 other wildcats now drilling (p. 187).

Deck's being cleared for start of area-pricing approach in Permian basin.

Here's what FPC is doing to get ready:

Producers will submit data on gas economics in area at hearing that begins October 3.

Deadline of October 12 has been set for individual filing of specified non-cost data on producer's operations and reserves.

Another deadline—December 29—has been fixed for filing of cost data for individual companies. Smaller producers will make similar filing later.

Also, FPC staff is compiling data related to every filed rate schedule covering Permian basin sales (p. 77).

The foreign scene:

When Russia's awakening gas industry hits its stride, the free world is going to know it.

In an article written especially for the Journal, former FPC commissioner William R. Connole explains why. He points

out that soviet gas for domestic use will soon displace enormous amounts of coal and millions of tons of oil. And the question of where that oil's to be marketed raises a crucial issue.

Connole was a member of the U. S. gas delegation that toured the Soviet Union this summer. His report on the trip—first in a series—begins on p. 80.

Poverty and politics are exerting pressure for new oil agreements between Indonesian Government and private firms.

Indonesia's foreign-exchange deficit grows daily. On the political side, President Sukarno wants operators to accept "contractor" status before mid-August anniversary of country's proclamation of independence. Then he could boast that oil has been nationalized in fact instead of on paper (p. 98).

New changes in Libya's oil law will raise operating costs.

The 50-50 profit split is being retained. But depletion allowance is out, fees and rents on concessions are going up, and posted prices—rather than market prices—will be the base for computing an operator's income (p. 100).

News in the making

U. S. rotary-rig activity is staying on the upswing.

For week ending July 31, total of operating rigs was 1,847 or six more than previous week. It was the fifth straight week that total had been above 1,800.

Second wildcat test is being made on Phillips-Sunray concessions in Australia's Great Artesian basin.

First test was plugged and abandoned at 9,070 ft. Now rig has been moved 35 miles northeast, in Queensland. Phillips, the operator, expects 6,000-ft. 1 Cothalow to be down in about 60 days.

Keep an eye on remote wildcat which will drill 6,600 ft. on new prospect in northern Grand County, Colorado.

Sunray Mid-Continent's Willow Creek anticline wildcat will go to Morrison Jurassic. Location is 8½ miles northwest of Grand Lake, 29 miles southeast of production at South McCallum field in North Park basin.

Calvert Exploration apparently will be the buyer of Blackwell Oil & Gas Co., Tulsa producing firm. Negotiations are expected to be completed this month.

Reports that Delhi-Taylor Oil is up for sale continue.

Latest of these—regarded as well-founded—says company board has voted to look for a buyer. Informed sources add that pressure for such a move has been coming from stockholders.

Market memo

Aug. 7, 1961

Marketers had better be prepared to make a smart defense of gasoline price increases following ruinous price wars.

Just two incidents underscore the bad public opinion price wars are creating:

. . . **In Michigan**—the governor, attorney general, and Detroit officials all are in the act loudly decrying increases posted by private branders and majors alike.

. . . **In Denver,** National Congress of Petroleum Retailers' annual convention recommended that its state associations request their state attorney generals to investigate oil industry pricing policies. NCPR alleges unfair competition, dual pricing, discounts, and kickbacks.

Good example of forthright way to meet the storm is testimony of Milo I. Hector, American Oil's regional manager, before Detroit Council. He said:

"I'll challenge anyone in this room to name a single important commodity in average family's budget that has a better price record than gasoline."

Hector then broke down the increased retail price of gasoline into taxes, dealer's margin, and gross to supplier, explaining what costs must come out of the gross. He thus easily showed that gasoline, even with its costly improvements, costs less now than 10 years ago.

Same strategy might be good for suppliers in every price-war area where they are striving to restore normalcy.

Marketing trends:

Sun is cutting octane ratings for two lowest grades on its nine-blend pumps in the Charlotte area. Announced reason: Lower octane fuels will satisfy needs of many customers' cars. Spokesman for North Carolina Oil Jobbers Association says move may help remove one problem causing price wars since Sun introduced its sub-regular blends (p. 90).

Mobil has aroused widespread curiosity with advertisements disclosing new "megatane" system of rating gasoline, described as "first modern criterion of total gasoline performance." Megatane scale goes beyond octane rating, the ads say, and is "first to take into account all important performance factors that enter into today's complex gasolines." Technical details, however, remain under wraps.

Refinery runs are still climbing—to 8,397,000 bbl. daily last week for a 113,000-bbl. gain over previous week and 107,000 bbl. over same week year ago.

Prices: Definite improvement is noted in Gulf Coast gasoline market which explains one-fourth cent boost in postings to 10.75 for 90-octane regular. Most of the recent soft spots have been eased by cargo purchases, and none now is pressing hard to sell gasoline. Similar improvement has occurred on the river. But gasoline in the Mid-Continent has eased off one-half cent to 11.50 for regular. Market is mixed on the East Coast with Atlantic restoring 0.8 of a cent cut in eastern Pennsylvania and Mobil reducing prices by the same margin in several upstate New York areas. Distillates remain firm in the gulf, river, and Mid-Continent but are weak in Philadelphia area where off-season allowance has been restored.

Good Wells Make Good News

Recent Acid Treatments that Solved Special Production Problems

August 7, 1961

Here are four recent treatments that show how Dowell uses job-tailored materials and engineered treatment planning to help operators solve production problems.

- Alberta, Canada (Old Oil Well) This well had been producing from the D-3 through perforations between 5980 and 5992 feet. When production dropped to 30 bopd, operator perforated two upper intervals: 5928 to 5940 feet and 5963 to 5976 feet. Original perforations were closed off temporarily with Dowell diverting agent and the new intervals were acidized with 2000 gallons 28 percent Dowell acid containing a wetting agent. Ten ball sealers were injected after each five barrels of acid. Injection rate was 2 - 2¼ bpm at 1760 - 2250 psi. Two weeks after treatment production was 68 bopd.

- Park County, Wyoming (New Oil Well) This well was completed into the 98-percent-soluble Madison lime at about 5000 feet. Treatment was engineered by Dowell using the Acid Guide*. 10,000 gallons acid-oil-emulsion type Retarded Acid, containing FLA* fluid loss additive, was injected at 8.5 bpm. 70 days after treatment, production had stabilized at 212 bopd and 187 bwpd -- above average for wells in the same field which had been treated with regular acid.

- Lamar County, Mississippi (Old Oil Well) Well was producing 35 bopd and 200 bwpd through perforations between 8644 and 8822 feet in the Tuscaloosa sand. Operator wanted to open up more of the section and improve oil production. Dowell treated using acid and diverting agent in stages. Twelve barrels of diverting agent were followed by seven six-barrel stages of acid. Three barrels of diverting agent were injected between each acid stage. Well came back making 102 bopd and 44 bwpd -- a good production increase plus a greatly improved water/oil ratio.

- Gray County, North Texas (Old Oil Well) This well was completed open-hole and shot with nitro in 1959. Production from the Dolomite lime, at 2961 to 3120 feet, had declined to three bopd. Well failed to respond to a large frac treatment. After Dowell acidized with 2000 gallons Stabilized Acid, production levelled off at more than 11 bopd. Operator was more than pleased with results.

Let a Dowell engineer help you select a treatment designed to solve your production problems profitably. Dowell services and products are offered in North and South America, Europe, North Africa and Iran. Dowell, Tulsa 14, Oklahoma.

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SERVICES FOR THE OIL & GAS INDUSTRY DOWELL
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Parkersburg Chain Driven Pumping Units are available from sizes CH25 to CH320

CONSISTENT COST CONTROL Choose Parkersburg Chain Driven Pumping Units for consistent low cost over the years. Numerous Parkersburg Units are still operating dependably and trouble-free after twenty years. Down time has been slight and will be still rarer with the new factory-sealed wrist pin and pitman bearings. High efficiency reducer and "one-man" adjustable counterweights decrease operating costs. Life is longer because of minimum wear of high strength heat treated chains on machined and flame hardened sprockets. Maintenance expense is low because field men can adjust chains for wear or replace chains when eventually necessary.

Ask your Parkersburg representative for the full story.

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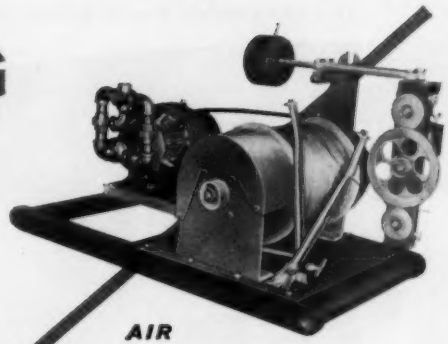
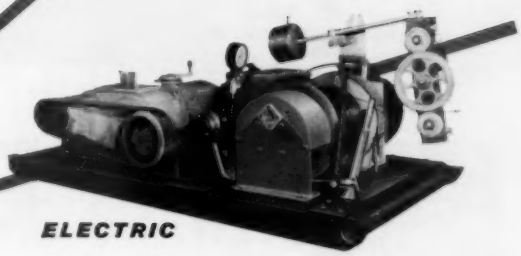
DOWNHOLE MEASURING VERSATILITY



AIR

DIESEL



ELECTRIC

with your choice of power

Whatever your downhole measuring requirements in shallow to deepest-known wells . . . Halliburton has the right device or combination of equipment to meet them with your choice of diesel . . . air . . . electric . . . or gasoline power.

DIESEL DRIVEN MEASURING . . . The diesel engine driven Super Duty Measuring Assembly serves in the toughest and most severe types of wireline operations. This complete package includes power . . . three-speed transmission . . . self-contained reel assembly . . . speed controls . . . measuring device . . . and wireline. The skid mounted assembly's convenient single point lift and rigid guard rails are ideal features for offshore platforms or any other heavy-duty wire line service.

AIR DRIVEN MEASURING . . . With the increasing use of pneumatic controls and drives for drilling equipment, many operators find it convenient to drive their units with air motors . . . particularly since safety practices often rule out diesel or electric power. Halliburton's radial five-cylinder air motor will mount on most Standard Measuring Reels or the Heavy Duty Reel.

ELECTRIC DRIVEN MEASURING . . . Designed for extra heavy duty use where dependable electric AC power is available. Equipment on the compact unit includes a three-speed transmission, a five hp variable speed electric motor, Extra Heavy Duty Reel, measuring device and measuring line. Halliburton located the motor controls for convenience in operating the assembly, and installed all wiring according to the latest codes and specifications.

See your Halliburton man for complete operational and maximum reel capacity data.

275 Service Centers . . .
just minutes away from your well!

MEASURING EQUIPMENT

Halliburton
COMPANY • DUNCAN, OKLAHOMA

The Guts of a Rig is its DRAWWORKS

And when you choose Brewster drawworks . . . you know it's so.
It takes bold, lusty power to make hole. Positive power, fast and sure.
Brewster gives you this . . . trip after trip.
Again and again.

BREWSTER

DEPTH RATING . . . . . 12,000' to 14,000'

TOTAL HORSEPOWER 1,200

Torque Converter, Fluid Coupling or Mechanical Drives. Heavily Shafted and Chained, the N-95 Drawworks Will Accept the Full 1,200 H.P. at the Drawworks Input Shaft.

DRAWWORKS

The Brewster N-95 is a single package side skidded drawworks. Integrally mounted on the main skid are the control panel, built-in transmission and hydromatic brake with all piping and water level tank. When placed on the drilling floor the drawworks requires the connection of only two chains to be ready for operation . . . one chain from input shaft to the compound . . . one chain from rotary drive to the table.

High and low, rotary and input clutches are latest design, high capacity, air-actuated Twin-Disc plate clutches. Clutches are mounted outboard for ease of servicing. Shaft assemblies are complete units and may be removed in the field for maintenance or service. All chains and high speed bearings are oil pressure lubricated. Drum shaft bearings are grease lubricated.

TRANSMISSION

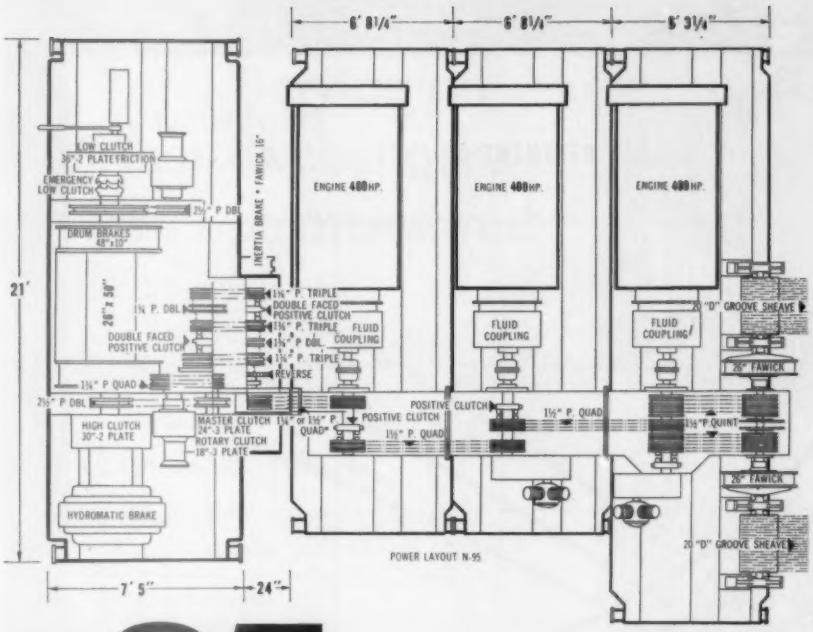
The compact chain transmission is enclosed in an oil-tight housing in the rear of the drawworks frame. It features Brewster's field-proved graduated-speed design with four forward speeds, each a 38% speed increase. A gear reverse is provided. When combined with the high and low drum drives, eight forward and two reverse speeds are available for hoisting. A third shaft in the transmission enables the driller to select a high or low rotary speed independent of the hoisting speed. All transmission clutches are air-actuated and air-interlocked to prevent engagement of opposing clutches.

COMPOUND

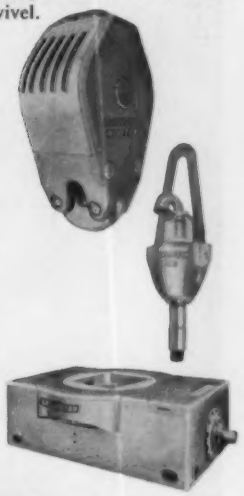
The N-95 is available with two types of compounds, sectional and heavy duty box type. Single and split level arrangements are available. Engines are coupled to the compound through Fawick air clutches which also serve as flexible couplings and act as engine disconnects when moving the rig. When fluid couplings or torque converter drives are used, engines can be coupled to compound by a flexible coupling. Compounding clutches are gear-tooth type and can be actuated singly or in groups giving a wide variety of compounding arrangements.

PUMP DRIVES

Single or dual pump drives are mounted at the rear of the compound. They are connected to the compound through Fawick air clutches. Air controls at the driller's position permit the drives to be used singly or together and at different speeds. Mounting of both pump drives at the rear of the compound simplifies rigging-up and manifolding . . . eliminates the need of idlers or notching the substructure.



Brewster Matched Drilling Equipment for the N-95 Drawworks includes the Model 400 Traveling Block, the RSH-22 Oil bath Rotary and the 7-SX Oil bath Swivel.



n95 ROTARY RIG DRAWWORKS

PERFORMANCE CHARACTERISTICS

Transmission Speeds	*Cathead Shaft R.P.M.*	*Rotary Drive Sprocket R.P.M.*	*Low Speed Drum Drive Line Speeds And Pulls*	*High Speed Drum Drive Line Speeds And Pulls*
Low	109	216	326′/Min. 88,500 lb.	1,235′/Min. 24,130 lb.
Second	151	300	457′/Min. 67,100 lb.	1,710′/Min. 18,490 lb.
Third	210	470	632′/Min. 48,600 lb.	2,380′/Min. 13,290 lb.
High	292	653	879′/Min. 34,900 lb.	3,310′/Min. 9,550 lb.

Line pulls based on 1,050 h.p. with 83.3% Rig eff.

BRAKES

Brakes are full 325° wrap, having 1⅛″ x 10″ linings on 50″ diameter drums, with a total braking surface of 2,836 square inches. Brake flanges are bolted to the main drum and are of the circulating water-cooled type. The compound equalizing and self-energizing brake design provides maximum holding power with little manual effort. Provision has been made to cradle mount a hydromatic or dynamatic brake on the side opposite the driller.

CONTROLS

All controls for the N-95 drawworks, compound engines and pump drives are air-actuated. The simplified control panel is mounted as an integral part of the drawworks package. Its convenient location permits the driller to have a full view of the drum and all operations on the drilling floor. Controls provide a wide selection of engine compounding arrangements. Transmission clutches are operated by turning a single hand wheel to the selected speed.

PORTABILITY

The N-95 has been designed for maximum ease in rigging down and moving. The entire rig can be moved in four over-the-road packages when the 3-engine compound is used. When the 2-engine compound is used, only three packages are required. The drawworks is separated from the compound by disconnecting a single chain and unbolting one guard. The controls, transmission, rotary drive and hydromatic brake are mounted on the main drawworks skid and moved as a single load.

LUBRICATION

All chain drives in the drawworks, transmission and compound are oil bath and oil pressure lubricated. They are enclosed in oil-tight housings. All main shaft and sprocket bearings are pressure oil lubricated and drum bearings are grease lubricated. An abundant supply of filtered oil is supplied by separately driven oil pumps. Oil cooling coils are available for the compound.

For more details ask your Brewster dealer *or write* THE BREWSTER COMPANY, INC.

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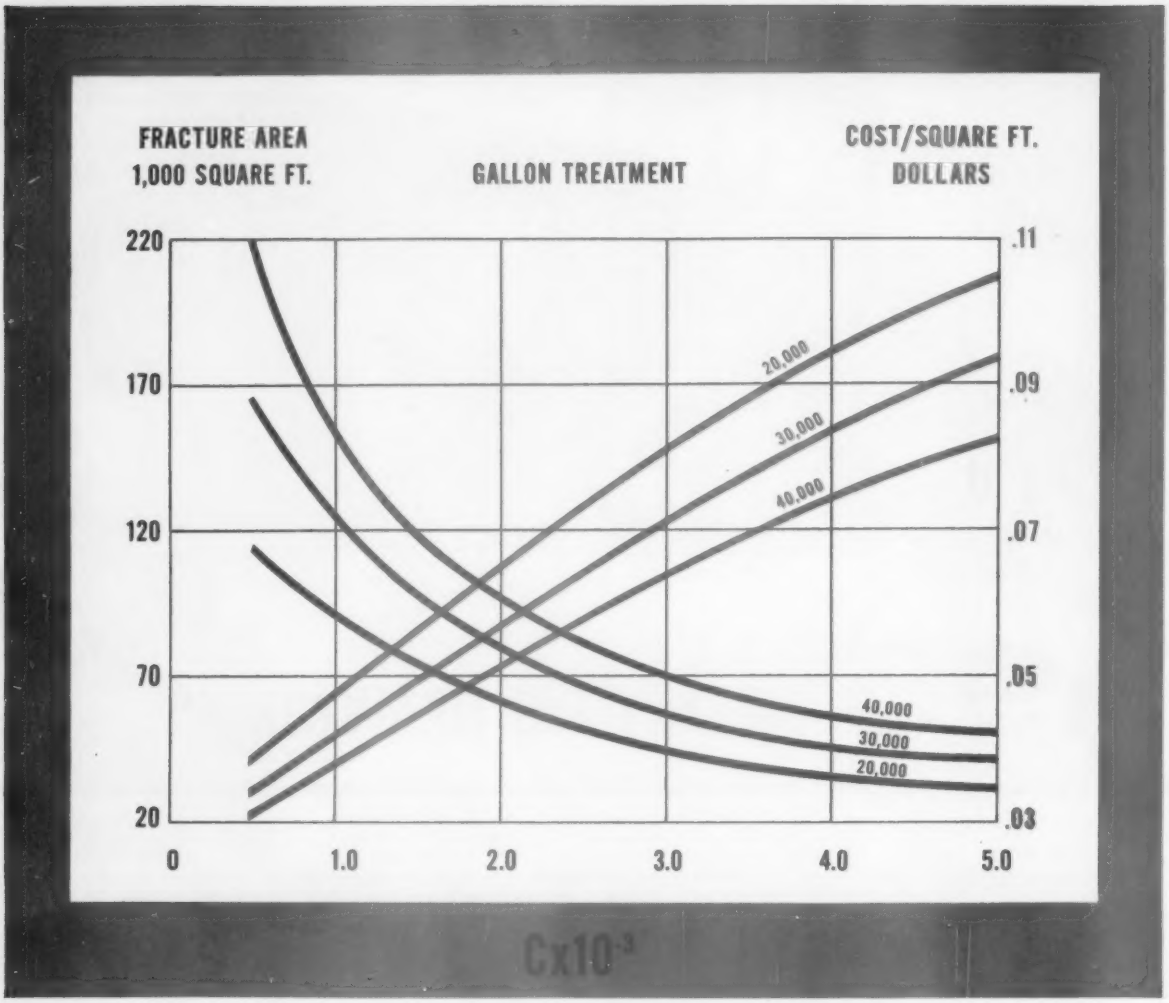
P. O. BOX 1095, SHREVEPORT, LOUISIANA

PRODUCTS OF CREATIVE ENGINEERING



Choose ADOMITE additives for efficient fracturing

Perhaps the most important consideration in any frac job is the fluid-loss coefficient, C, of the fracturing fluid. As a direct measure of fluid loss, it is inversely related to the efficiency of the oil. A low C value means more fracture area with lower costs per square foot. Most refined frac oils will give a C value of 5.0×10^{-3} and higher. Coefficients of 1.0×10^{-3} or lower are commonly obtained with ADOMITE fluid-loss additives.

The importance of a low C factor is readily apparent from a study of the graph. It shows a number of typical situations with a pump rate of 30 BPM.

For example, a 40,000 gallon job with a C factor of 1.0×10^{-3} will result in a fracture area twice the area of a treatment run with a C factor of 3.0×10^{-3}. The higher fracture area means substantial reductions in cost per square foot... the only *true* measure of efficiency!

For additional information or copies of the nomographs used for calculations of fracture design, contact your nearest ADOMITE representative:

R. T. Means, P.O. Box 431, Midland, Texas, MU 4-7411
T. M. Brown, Pampa, Texas, Phone MO 5-2992
J. M. Foster, Wichita Falls, Texas, Phone 723-8181
J. D. Hawsey, Midland, Texas, MU 4-7411
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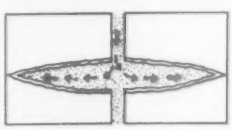
fluid-loss additives



"30,000 frac jobs can't be wrong!"

Total Service on Heat Exchangers can't be measured

by the foot

Anaconda fabricates the finest copper alloy tube, sheet, and heavy plate made for power plant, process industry and marine heat exchangers.

More than that. We also provide Total Service that you can't measure by the foot. Only Anaconda delivers such a wide variety of copper alloys, in sheet, large-size plates and single or duplex tube. Among these are Anaconda exclusives like Everdur®, Ambraloy, and Cupro Nickel, 30%-707, a new, lower-cost, high-strength feedwater heater tube alloy. Total Service also includes the experienced on-the-spot guidance and advice of Anaconda technical representatives to help solve any heat transfer or corrosion problem.

Anaconda satisfies your needs for heat exchanger materials. Why not write for your copy of Publication B-2. This 44-page presentation of our tubes and plates for condensers and heat exchangers details properties and fabrication methods. Address: Anaconda American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 61-322

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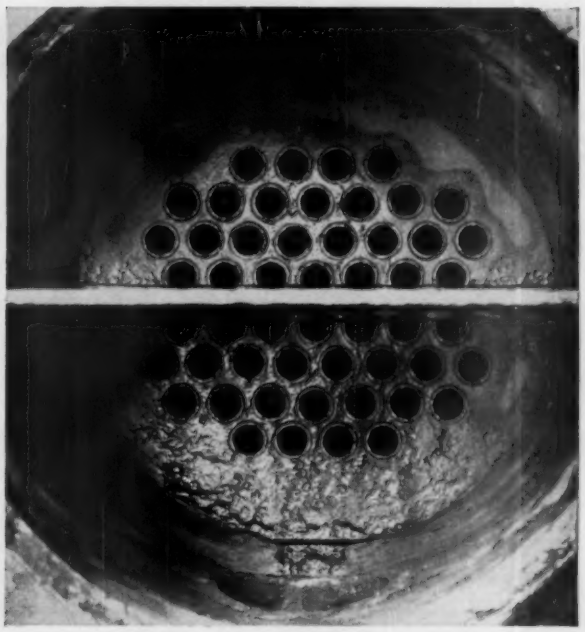
AMERICAN BRASS COMPANY

Depend on CB&I ...
"Number One" builder of
FLOATING ROOF TANKS
CB&I-built floating roof tanks are serving the petroleum industry throughout the world. The reason: superior design, construction and performance of CB&I structures . . . world leaders in reducing evaporation loss, retarding corrosion and minimizing fire hazard.
Typical of CB&I's *Craftsmanship in Steel* are the five Horton® Double-Deck Floating Roof Tanks shown below. Built for a major oil company in Venezuela, each has a capacity of 268,000 barrels.
CB&I also offers the widest choice of seals for floating roofs. These include liquid filled fabric, gas inflated fabric, resilient foam fabric and metallic seals.
CB&I offers the *coordinated services* of a world-wide organization with experienced CB&I erection crews ready to go to work on your job, now. Write for further details.
CB&I
Chicago Bridge & Iron Company
332 South Michigan Ave., Chicago 4, Ill.
Offices and Subsidiaries Throughout the World
P2CB

Descale equipment quickly, safely —without dismantling!

BEFORE—This condenser was badly clogged with hard-water scale. Mechanical cleaning of the tubes would have been difficult, time-consuming and costly. To use hydrochloric acid would pose danger to nearby equipment and personnel.



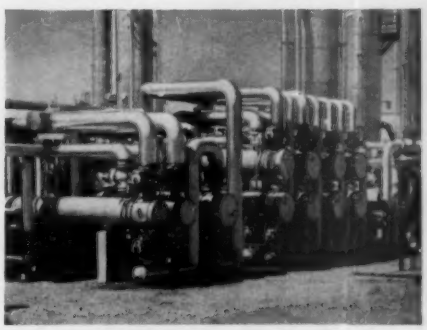
AFTER—It was easily cleaned *without dismantling* by circulating a water solution of a sulfamic acid-based cleaner for an hour. Short downtime, *no* danger to equipment and complete safety for personnel!

Use a dry-acid cleaner based on Du Pont Sulfamic Acid

They're effective. Dry-acid cleaners dissolve most water-side deposits found in condensers, boilers, compressor jackets, heat exchangers, etc. Yet they're much less corrosive to metal than hydrochloric-acid cleaners.

They're easy, safe. Just dissolve the solid cleaner in water and circulate through the equipment. No danger of broken carboys, spilled liquids or toxic fumes—glasses and gloves are the only protective clothing needed!

They're economical, fast. 1 lb. of dry cleaner does the job of 1.3 lb. of 28% hydrochloric acid—you save on shipping, handling, storage and downtime (because there's no dismantling).



Various types of refinery equipment, like these heat exchangers, are easily descaled with a cleaner based on Du Pont Sulfamic Acid. The equipment is cleaned *in place* with a minimum of downtime.

Ask your water-treatment company's technical representative about dry-acid cleaners; chances are, he can supply you. Or send the coupon for booklet and names of formulators offering dry-acid cleaners based on Du Pont Sulfamic Acid.

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING ... *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Industrial and Biochemicals Department, N-2545OG
Wilmington 98, Delaware

Please send your "Descale" booklet and names of formulators offering cleaners based on sulfamic acid.

*Name*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

SAFE, SIMPLE, SILENT GROVE FLEXFLOS®

FOR ANY PRESSURE REGULATING NEED

There's a complete line of Grove Flexflo regulators for pressure reducing and back pressure services. Flexflos can be supplied self-operated, pilot-operated or with Grove electric, pneumatic and hydraulic operators. A single moving part—a silently flexing rubber tube that can never slam, stick or wedge, makes Flexflos simple, dependable. The tube assures positive shut-off even though foreign matter may be trapped between the core and tube. In cast iron or steel; screwed end: 1" to 3", flanged end: 2" to 12". Control pressure ranges from 2 psi to 1500 psi.

GROVE REGULATORS

GROVE VALVE AND REGULATOR COMPANY

a subsidiary of Walworth 6529 Hollis Street, Oakland 8, California

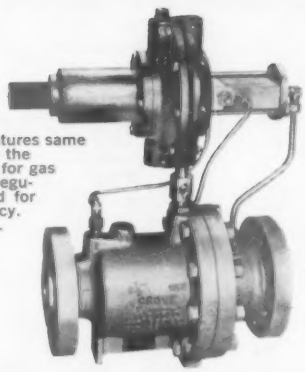
Offices throughout the U. S. and in Western Canada

GAS BACK PRESSURE FLEXFLOS

Model 888, self-operated, gas dome-loaded. Setting is fast, easy, without springs or pilots. Recommended for natural gas, air and liquids. Bulletin #888-D.

GAS PRESSURE REDUCING FLEXFLOS

Model 80-820 where extreme accuracy is critical. Sensitive, spring loaded model 820 Grove pilot is a diaphragm controlled, three-way throttling valve. Seven adjustable spring ranges from 2 psi to 1200 psi. Send for Bulletin #813-B.



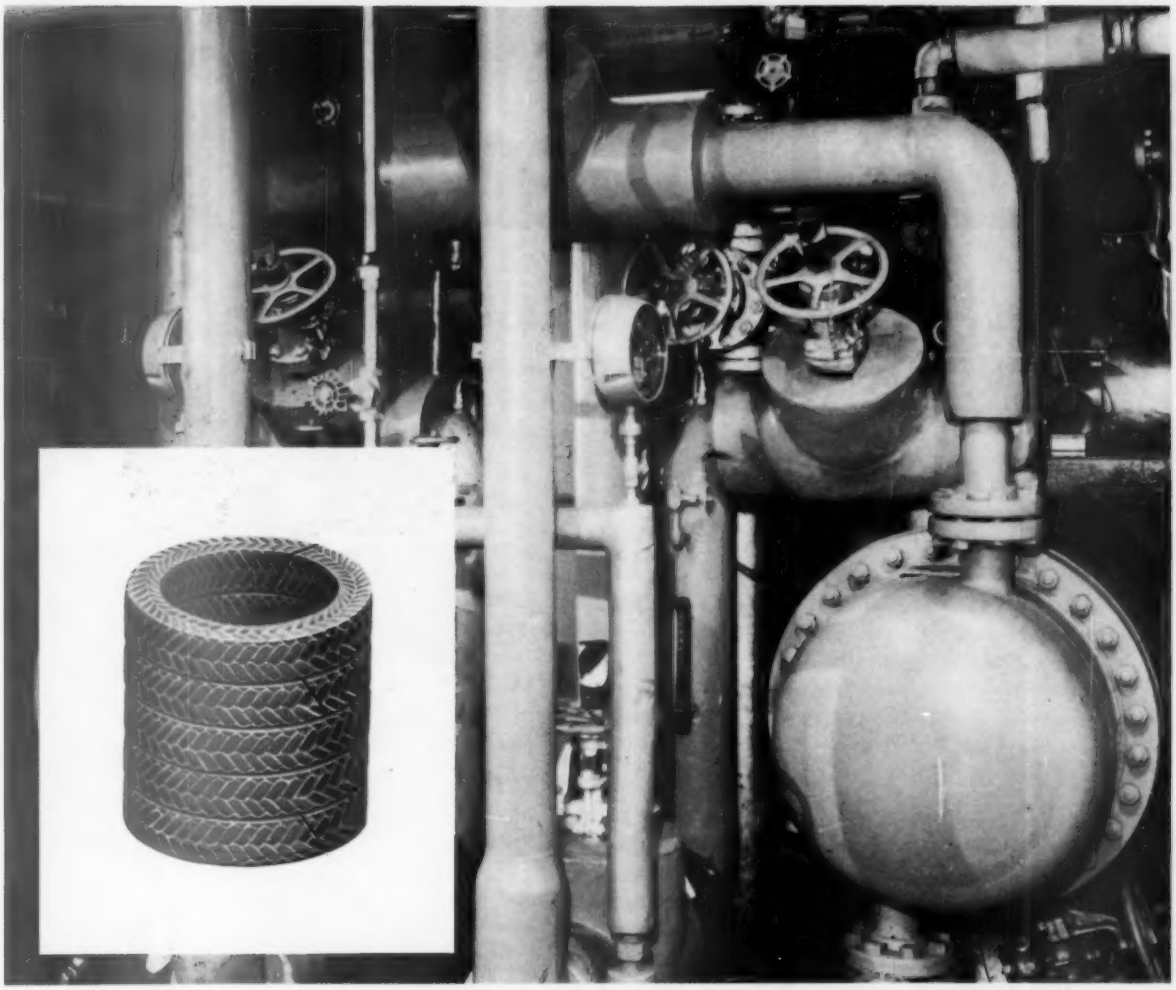
Model 80-830 features same type of pilot as the 80-820, adapted for gas back pressure regulation. Designed for extreme accuracy. Bulletin #813-B.

Grove Sets Regulator Standards for Others to follow

7078

Model 80-896A, designed for "pounds to ounces" pressure reduction. For inlet pressures to 100 psi and adjustable control ranges from 2 ounces to 20 psi. Bulletin 813-B.

Model 80-833, for low pressure services. 833 pilot is available with three adjustable spring ranges: 10-30 psi, 15-75 psi and 25-150 psi. Bulletin #813-B.



Packings of asbestos and TEFLON® TFE in oil-heater valves saved $30 per year per valve

The gate valves on the feed lines of this oil heater handle boiler fuel oil at 200 psi and 130°F. to 224°F. They are packed with asbestos impregnated with a Du Pont TEFLON TFE-fluorocarbon resin. During seven years of service these packings have never leaked . . . never needed retightening or replacement. The impregnation of TEFLON forms a mechanical bond and cannot squeeze out, unlike other additives that leave a dry, abrasive base.

The switch to packings made with TEFLON has saved $20 per year in retightening and repacking costs for the two valves, and about $40 per year in product losses formerly caused by leaking valves.

Under more severe service conditions, such as are often encountered in the petrochemical industry, there are additional decisive reasons for using TEFLON TFE resins. These all-purpose packing materials are inert to virtually all chemicals and solvents, over a temperature range from −450°F. to 500°F. Their low-friction characteristics minimize torque requirements and reduce wear on cylinders and shafts.

These facts have been put to the hard test of dollars-and-cents cost accounting in many hundreds of applications. In addition to reduced costs of packing maintenance and replacement, the use of TEFLON permits standardization, cuts down inventories of many different types of packing. Consult your supplier about the many constructions available in packings made with TEFLON, and write for new booklets: "Packings for Valves and Pumps", and "Designing with TEFLON". Address: E. I. du Pont de Nemours & Co. (Inc.), Dept. OG-87, Room 2507T, Nemours Building, Wilmington 98, Delaware.

In Canada: Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.

DU PONT REG. U.S. PAT. OFF. **TEFLON®** FLUOROCARBON RESINS

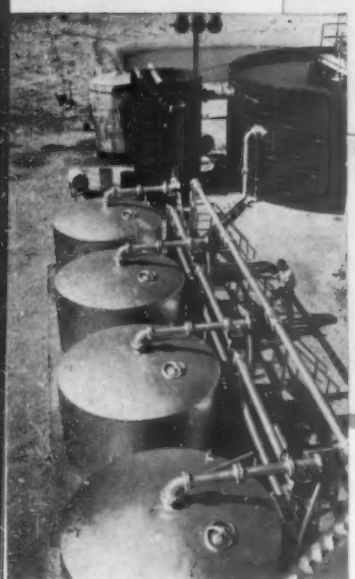
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

TEFLON is Du Pont's registered trademark for its family of fluorocarbon resins, including TFE (tetrafluoroethylene) resins and FEP (fluorinated ethylene propylene) resins.

121 waterflood

Alberta

Planning, design, and erection of this Oklahoma waterflood installation handled by Bethlehem under a turnkey contract.



These 108-in. diameter graded-gravel-bed filters are part of a Bethlehem-turnkeyed job in Texas.

projects

have been packaged or turnkeyed by Bethlehem

This Bethlehem package, under construction in West Texas, teams up three of one of the hardest-working injection pumps going—the reliable TP-3 horizontal triplex plunger pump.

If you're looking for an outfit with plenty of experience, try Bethlehem. We were the first major supply company to offer engineering services for the planning and construction of secondary-recovery projects in the Mid-Continent area. Since that time—20 years and 121 projects ago—our engineers have worked with virtually every type of water, well, and weather condition. Their services, whether on a package or turnkey basis, are available to help make your own program successful.

Everything from the supply well to the injection well . . .

On turnkey contracts, Bethlehem provides complete engineering and labor services, orders and expedites all equipment, erects the plant, checks it thoroughly, and then turns it over to the customer after it is operating as designed. We design complete water supply, treating, and injection systems to meet our customers' requirements . . . and will assist in their economic analysis, if desired.

. . . Or anything in between.

On packaged jobs, where Bethlehem is given responsibility for only a portion of the waterflood project, we furnish the basic design and engineering, together with all necessary equipment. The customer then builds his own facility, drawing on Bethlehem engineers for counsel on proper installation and operating procedure.

Clear-water storage tank serves an open-sided injection station built by Bethlehem. We'll take on the whole project, or will package only part of it.

Let us tell you more about Bethlehem turnkey and package services. Any of our offices or stores can supply full details.

BETHLEHEM STEEL COMPANY
SUPPLY DIVISION
General Offices and Export Dept.: 21 East Second St., Tulsa, Okla.
Canadian Distributor: Bethlehem Supply Company of Canada, Ltd., Calgary, Alberta, Canada

BETHLEHEM STEEL
SUPPLY DIVISION

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, Supply Division
Sales Department
Box 2171
Tulsa 2, Oklahoma

Please send me your illustrated descriptive Booklet No. 1655, "Bethlehem Waterflooding Services."

Name & Title .....

Company .....

Address .....

City & State .....

Ask Your *FISHER/MAN* How To

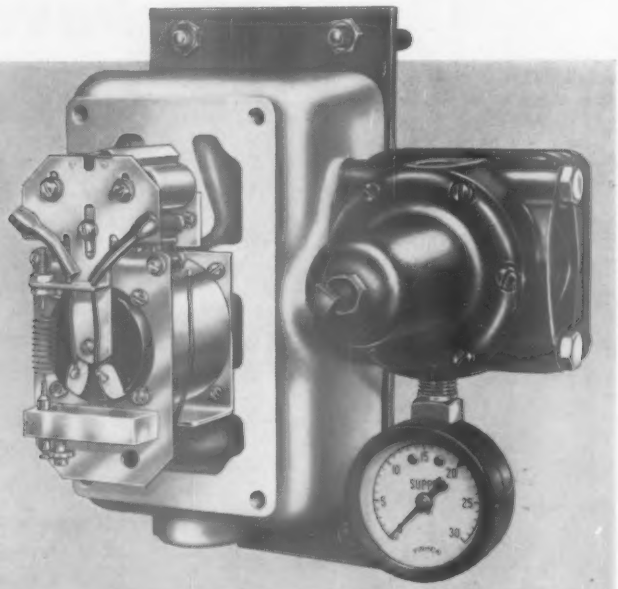
SPEED THE INPUT SIGNAL to the CONTROL VALVE

FISHER

TYPE

543

ELECTRO PNEUMATIC TRANSDUCER



Available with or without a pneumatic valve positioner

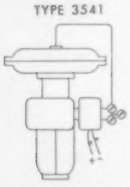
Here's an electro-pneumatic transducer developed for use in electrical control loops where the final control element is pneumatically operated. Explosion proof design makes it ideal for use under hazardous conditions. Input signals may range from 1 to 5 ma. through 10 to 50 ma. ... output from 3 to 15 psi through 6 to 30 psi. Built-in volume relay permits direct operation of the pneumatic actuator from the Transducer. No extra relays or boosters needed. Relay can be serviced independent of electrical assembly. Unit is completely reversible by reversing input leads and rezeroing.

If you want additional information on the Type 543 Electro-Pneumatic Transducer write Fisher Governor Company.

TYPICAL CIRCUITS		
Input Current	Load Requirements of Controller	Actual Internal Resistance of Transducer
1 to 5 ma dc	3,000 ohms maximum	2,500 ohms ±125 ohms
1 to 5 ma dc	12,000 ohms ± .5%	12,000 ohms ± 50 ohms
10 to 50 ma dc	500 ohms maximum	57 ohms ± 4 ohms

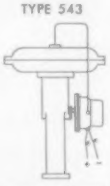
PERFORMANCE DATA	
Linearity	1% of full range
Air Consumption Rate	2 SCFH with 15 psi output pressure
Resolution Sensitivity	.05% of input range
Frequency Response	Complete frequency response data with Fisher topworks available

TYPE 3541



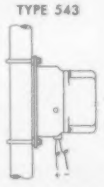
Electro Pneumatic Controller Mounted on Control Valve

TYPE 543



Transducer Mounted on Control Valve

TYPE 543



Transducer Mounted on Stand Pipe

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD ... CHANCES ARE IT'S CONTROLLED BY ...

FISHER GOVERNOR COMPANY

Marshalltown, Iowa / Woodstock, Ontario / London, England

CONTINENTAL EQUIPMENT CO. DIVISION, Coraopolis, Pennsylvania

FISHER® Controls

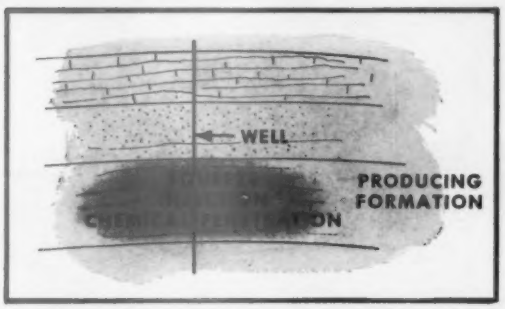
SINCE 1880

Visco Squeeze Treatment Chemicals Designed to Fit Varying Well Conditions

Corrosion Control Lasts, Costs Less with New Visco Formulas, Methods

Squeeze treatment in producing wells continues to grow in importance as an economical, long-term method of obtaining effective corrosion control. It is simply the pressure injection of corrosion inhibitor chemical into the producing formation, from which it is released in approximate proportion to produced fluid volume over a period of time—anywhere from two to sixteen months.

Visco has found squeeze treating of sufficient interest to producers to justify development of specialized chemicals and techniques to permit most effective use of the method.



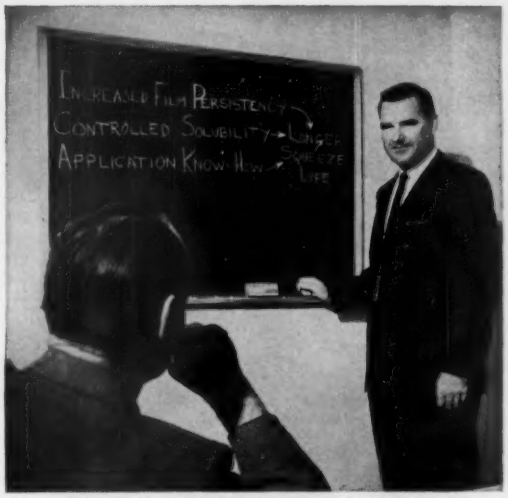
Squeeze technique forces chemical corrosion inhibitor into formation around well bottom. Chemical is carried back with produced fluid. The excellent film persistency of Visco squeeze treating chemicals assures long-lasting, low-cost well protection.

Effects of Formation

Producing formation composition, porosity permeability and position can have an important bearing on the success of squeeze treatment corrosion control . . . They are important considerations in the development of special Visco formulas for this purpose.

Determining Chemical Type

As with any operation affecting producing formations, experience is the most dependable guide. Chances are great that the conditions you have in your area have been closely paralleled by other Visco squeeze treating experience. Further, Visco Formulas such as



Visco's P. H. Mallette, Product Manager for Corrosion Control Chemicals, discusses factors considered important in assuring effective squeeze treatment.

new 939, 956, and 990, were developed to broaden the effectiveness of corrosion control with squeeze treatment, and so are a big help in pinpointing the best chemical and method to apply to specific well characteristics.

Field Experience

Squeeze treating can offer some substantial cost and time advantages for effective corrosion control in many types of producing wells . . . BUT, probably more than any other treating method, squeeze treatment demands skill and experience, as well as effective chemicals, to assure success. No one is better equipped than Visco . . . *we* firmly believe no one else can do as well for you.

Help, Now

Visco action toward being useful in your activities is as close as your phone—and nearly as quick as picking it up. Your move.

VISCO PRODUCTS COMPANY
Incorporated
A subsidiary of Nalco Chemical Company
P.O. Box 87 Sugar Land, Texas

Deutsche Nalco-Chemie, G.m.b.H., Frankfort, Germany
Nalco Italiana, S.p.A., Rome, Italy
Nalco de Mexico, S.A. de C.V., Mexico, D.F., Mexico
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Visco® . . . *Serving the Oil Industry through Practical Applied Science*

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The "OILWELL" string...

PRODUCTS
SERVICES
STORES

Here's why "Oilwell" Century Pumping Units pay dividends

There's always a reason for success. In the case of our Century Pumping Units, the reason is as plain as day: we designed them *after* we surveyed operators to find out what they wanted in pumping units. They asked for dependability, economy, simplicity and safety. We gave it to them in these outstanding Century features:

Their *dependability* comes from the primary structural elements being rigidly welded and perfectly aligned with front samson post legs widely spaced on a solid, T-shaped base. Their *economy* comes from wearing parts engineered for *heavy-duty* service. Their *simplicity* and *convenience* in well servicing comes from an easy-to-roll-back arc with automatic latch, and from a one-piece slant-slot yoke. Ease of care and operation comes from the fact that routine maintenance can be done at ground level. *Safety* comes from the Type G Cranks that make maximum use of counterweights and are easy to adjust with the operator working safely to the side of the unit . . . with lots of toe room between weights and floor.

From design theory to the smallest actual details, Century Pumping Units are the most modern, most efficient available. For full information, write or ask for a free copy of our descriptive booklet 27-61.

USS and "Oilwell" are registered trademarks

The service is great in The Pump Room

It's a different sort of menu than you'll find in Chicago's famous Pump Room, but you can't beat "Oilwell" pump shop service anywhere. Every "Oilwell" pump shop is staffed with specialists who have a background of technical and operating experience. They're there to help you with your pump problems, whether it's pump selection, maintenance, or reworking. On certain pumps, such as SPUN METAL sectional liner subsurface barrels, "Oilwell" offers an *exchange service* that gives you an indentical reworked barrel at less than half its original cost. No matter what your pump problem is, take it to the nearest "Oilwell" pump shop where you'll get the superior service that comes with every "Oilwell" product you buy.

Meet Don O'Bryan

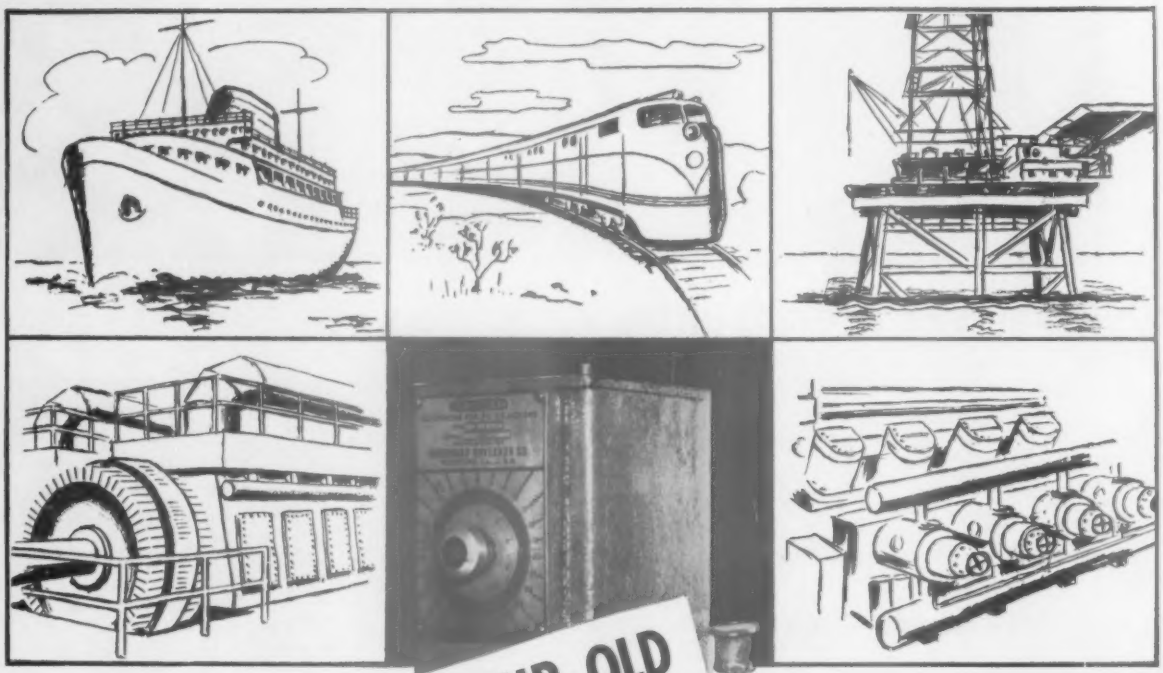
Don is the "Oilwell" store manager in Houston, and he has the background it takes to help you with your problems. He's been with "Oilwell" 28 years, and he knows the oil business inside and out.

Every "Oilwell" store manager is there to see that you get what you need—emergency-fast when necessary. From pumping unit and prime mover to the perforated nipple on the bottom of your tubing string, "Oilwell" stores are stocked with top quality producing equipment in the types and sizes that are locally popular. They carry everything you need from the hundred-and-one fittings, small tools and miscellaneous hardware to flashlight batteries and wiping rags. And store men like Don O'Bryan have access to the knowledge and up-to-the minute information to help you on practically any equipment problem. That's a good reason for stopping by your "Oilwell" store.

USS **Oil Well Supply Division of United States Steel**

Executive and Export Offices: Dallas, Texas

BACK ON THE JOB AGAIN...



...as good as ever after a Woodward factory overhaul

Your worn or obsolete Woodward Governor needs a "factory overhaul" to return it to top operating condition. Experienced technicians, using Woodward's modern facilities, special tools and testing equipment, completely rebuild and adjust your governor. All latest engineering improvements are added to make it better than new and just like those now coming off the assembly line — and it's covered by a new governor warranty.

You can save valuable time and be assured of full satisfaction with Woodward's popular governor exchange program. Just tell us when you plan to shut down for repairs. We'll promptly ship you a rebuilt, modernized governor to fit your engine. You can quickly install it and return your old governor to us. This one we'll overhaul and return to our stock. You're only charged for labor, parts and shipping costs — a real saving over a new governor purchase.

If you plan to have a competent diesel repair shop, located near you, service your Woodward governor, we'd like to help. Send us the serial number, the equipment it's controlling and what your troubles are. We'll send instructions, parts bulletins and suggest possible needed parts.

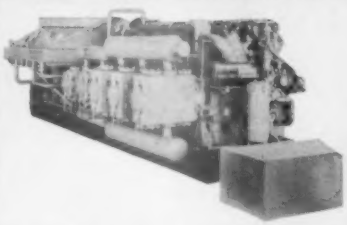
"Worlds oldest and largest manufacturer of hydraulic governors exclusively"

WOODWARD GOVERNOR COMPANY

ROCKFORD, ILLINOIS

Fort Collins, Colorado • Schiphol, The Netherlands • Slough, England • Tokyo, Japan

D-108



Design engineered for gas booster service in the Louisiana Gulf Coast area, this packaged GMXF-10 compressor moves 4.43 MMSCFD. It is rated at 825 bhp. Equipped with Entronic Controls for remote field operation, this unit is a typical example of the efficiency gained by specifying C-B/Southern Packaged Compressor Plants.

CB/S

PACKAGED COMPRESSORS

Designed Engineering For . . .

CB/S Packaged Compressors Starts With the Customer's Problem

Sound gas compression engineering starts with understanding the basic problem. C-B/Southern sales engineers are registered petroleum engineers with actual producing experience. They assess the customer's problem, whether it is gas gathering, gas lift or gas injection, to make positive, workable suggestions. From quotation to field installation, engineering knowledge is based on practical experience. For example, last year, C-B/S built more horsepower than any other two compressor packagers combined. And because the company offers the widest range of horsepower size, C-B/S engineers have the right component to meet every specification the customer wants.

As an added benefit, C-B/Southern Packaged Compressor Plants are never orphans. Backed up by engineers in 22 Cooper-Bessemer sales and service offices, C-B/Southern service operates on a 24-hour schedule, everywhere.

C-B/S Packaged Compressor Plants are available in horsepower ratings from 100 to 1100; unitized compressors, both reciprocating and centrifugal, to 10,500 horsepower.

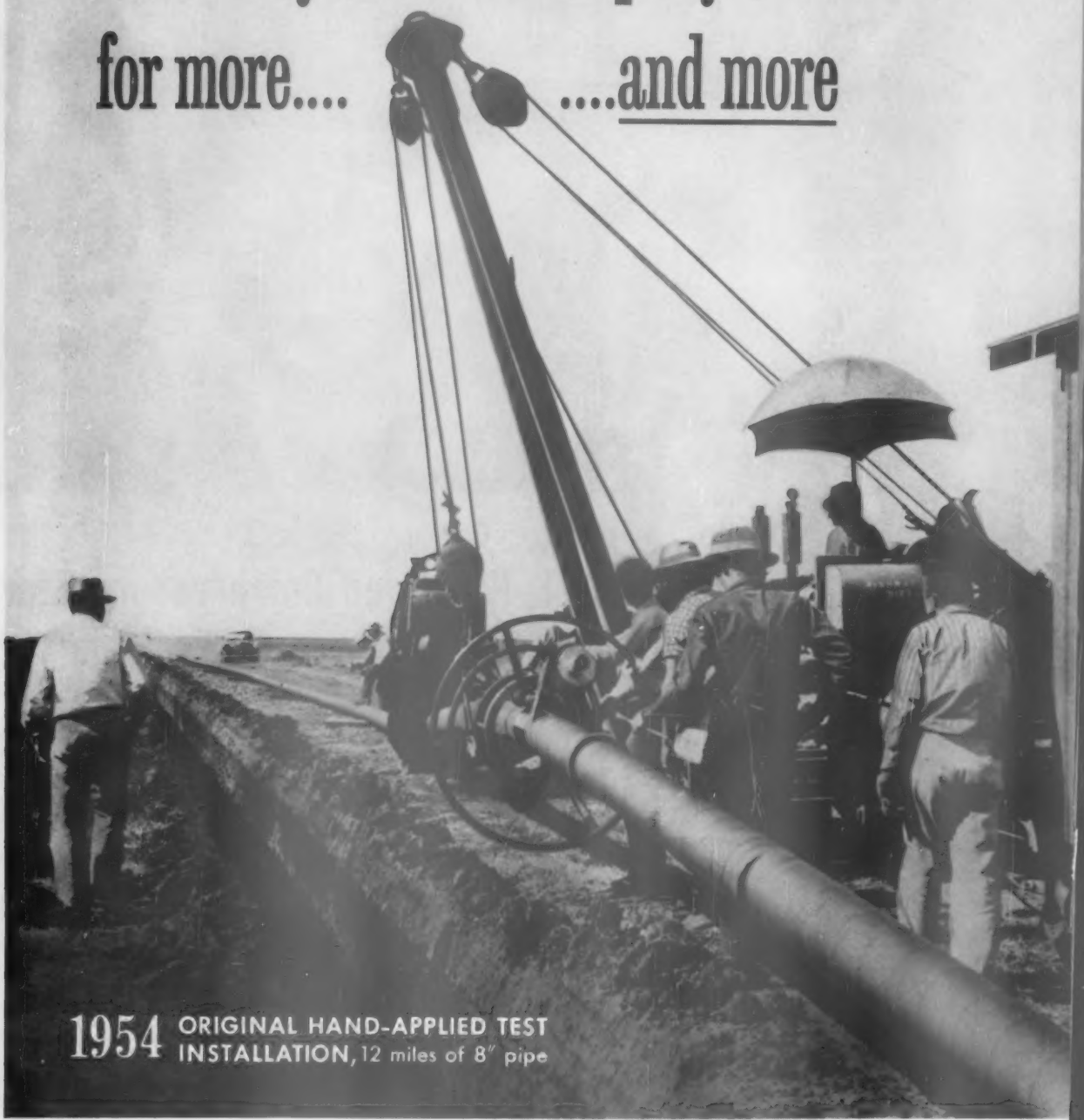
CB/S

C-B SOUTHERN **P. O. BOX 19267**
HOUSTON 24, TEXAS **HOmestead 8-5441**
Manufacturers of packaged compressor plants for gas gathering, gas lift, gas injection applications

A Division of The Cooper-Bessemer Corporation

POLYKEN PROTECTION—METHOD OF PROVEN PERFORMANCE

Seadrift coating job rated tops over the years...so company comes back for more.... ....and more



1954 ORIGINAL HAND-APPLIED TEST INSTALLATION, 12 miles of 8" pipe

Bell hole examination convinces second firm, too, to make important use of Polyken protection!

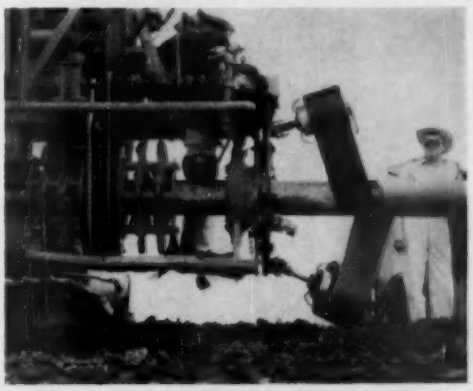
Proof of dependable performance . . . most graphic endorsement of Polyken. Case in point: In 1954, Seadrift Pipeline Co. set up a test installation of 12 miles of 8" gas pipeline from Bee County to Seadrift, Texas, wrapped with Polyken #900 Black. Its fine performance through subsequent years, as demonstrated by very satisfactory cathodic protection requirements and the absence of corrosion, made Polyken the choice again for the company's line from Live Oak County to Seadrift (31 miles of 6") in 1957.

Then, in 1960, continuing good cathodic protection results, confirmed by a bell hole examination of the original 8" job, proved Polyken tape still in *top-rated* condition after 6 years. No rust or corrosion on pipe. Tape itself showed no sign of time-wear or deterioration.

These jobs were labeled "very successful installations". With all this evidence at hand, Seadrift officials again put Polyken protection to work on their 1960 projects—more than 300 miles of 6" and 8". And engineers from another major pipeline company, present at the above bell hole inspection, developed their own conviction of the durable protection of Polyken on the basis of this 6-year experience. They ordered this *proven performance* coating for an important part of their new products line in Iowa.

The key to these decisions is performance—proven performance. That's why the growing list of Polyken users includes some of America's most exacting firms. Get the full details on Polyken performance and economy from your Polyken representative, or write Polyken Sales Division, 309 West Jackson Blvd., Chicago 6, Ill.

1957 ANOTHER SEADRIFT INSTALLATION, 31 miles of 6" pipe



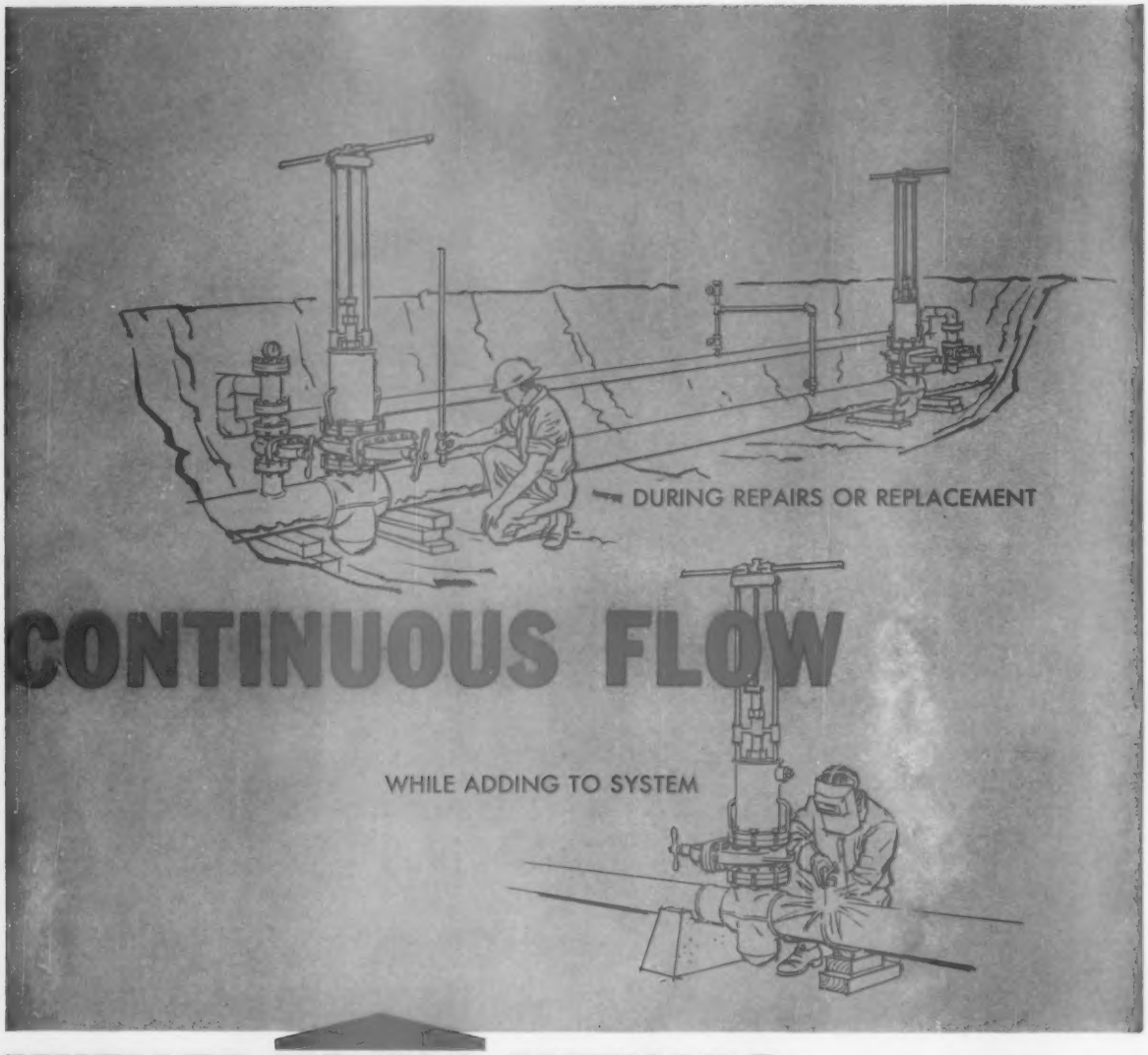
1960 STILL ANOTHER SEADRIFT INSTALLATION, more than 300 miles of 6" and 8" pipe

1960 ANOTHER MAJOR PRODUCTS PIPELINE INSTALLATION, on 8" pipe

Polyken®

Experienced in modern PROTECTIVE COATINGS

THE KENDALL COMPANY
Polyken Sales Division



MUELLER® NO-BLO® METHODS permit you to tap a line, under pressure, *for* tie-ins, repairs, replacements and other purposes ■ ■ ■ without loss of fluid ■ ■ ■ without shutting down system! ■ Rugged, "service-proven" Mueller Products and No-Blo Methods safely permit these necessary operations *anytime* without expensive downtime. Ask the Mueller Representative in your area to explain the uses and applications of the complete line of Mueller No-Blo Products and Equipment.

continuous flow . . .
another basic benefit from

MUELLER CO.
DECATUR, ILL.
Factories at: Decatur, Chattanooga, Los Angeles
In Canada: Mueller, Limited, Sarnia, Ontario

5580

Because it can actually repay its cost . . .

Davison Silica Gel for natural gas drying has more than tripled in use in only 6 years!

Last year over three times as much Davison Silica Gel was installed in natural gas drying operations as was sold in 1955! 320% increase . . . in only 6 years. The growth hasn't stopped yet. More and more natural gas processors are switching to Davison Silica Gel.

Why? Davison Silica Gel can actually repay your cost of natural gas drying with recovery of valuable hydrocarbons. The large surface area and pore volume of Silica Gel attain recovery efficiencies up to 95%, producing as much as 3 gallons of usable pentane-plus per 100 pounds of Davison Silica Gel.

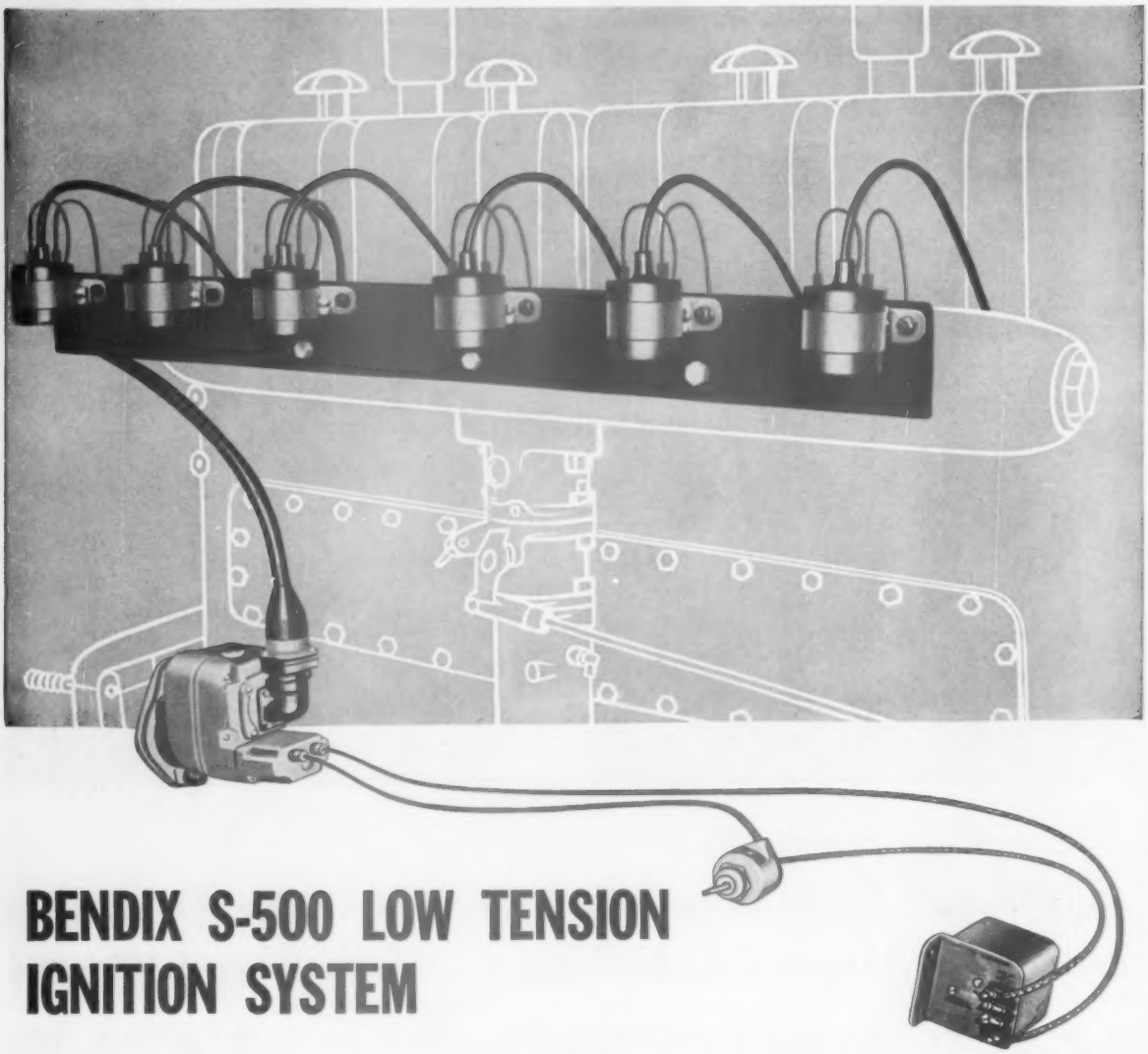
Regeneration is easy and almost total. Some installations are still on stream without change after seven years, others three or more. For natural gas drying, hydrocarbon recovery, drying of cracked refinery gases, ethylene and propylene, Davison Silica Gel's high purity and greater capacity make it the ideal desiccant. For complete information, write today:

GRACE

DAVISON CHEMICAL

Industrial Chemicals Dept. 3108
Baltimore 3, Maryland

The latest for small-to-medium industrial engines



BENDIX S-500 LOW TENSION IGNITION SYSTEM

The S-500 System provides the ultimate in starting and operating efficiency for your four, six, and eight cylinder industrial engines. Specify the new Bendix[T.M.] S-500 Low Tension Ignition System. It features "the modern starting concept"—retard breaker magneto and starting vibrator system.

This complete Low Tension Ignition System—including transformer coils, wiring cable assembly, starting vibrator, ignition and starting control switch, and retard breaker magneto—is custom-engineered to assure positive ignition at all cranking speeds and varied retard requirements. It is furnished in base or flange mounting, flameproof and radio shielded, is adaptable for manual or automatically controlled installations.

TRADEMARK

The S-500 Series, either base or flange mounted, is supplied with the following features:

S-500 Standard Shielding, adjustable drive assembly.
S-501 Standard Shielding, adjustable impulse coupling.
S-502 Super-shielded, adjustable drive assembly.
S-503 Super-shielded, adjustable impulse coupling.
S-504 Standard Shielding, retard breaker, adjustable drive.
S-505 Super-shielded, retard breaker, adjustable drive.

For additional information concerning the best Bendix Ignition System for your particular engine requirements, write:

Scintilla Division
SIDNEY, NEW YORK

THE Bendix CORPORATION

Export Sales & Service: Bendix International, 205 E. 42nd St., New York 17, N. Y.

Sales

MINIMUM OF $8000 ON DRY HOLE COMPLETION TEST

LYNES Wildcat Open-Hole Test Service takes the gamble out of completion of questionable 8800-ft. New Mexico wildcat. Drill stem tests on a wildcat in the Artesia, New Mexico, area had been inconclusive so the operator was faced with the choice of setting casing, perforating, treating the formation and recovering the casing if the hole was a duster or of abandoning the well without additional testing at the risk of passing by a producer OR HE HAD THE CHOICE OF RUNNING A LYNES OPEN HOLE INFLATABLE WILDCAT TEST STRADDLE PACKER THAT WOULD ALLOW HIM TO MAKE POSITIVE WELL TESTS AT A VERY LOW COST.

Choosing the LYNES Test Service, the operator saved $8000 by eliminating normal completion and abandoning expense to conclusively prove the well dry—savings up to $20,000 have been reported. Had the well proved a producer, he would have saved a well that he might otherwise have abandoned rather than risk the cost of completing a dry hole.

The swab test through a LYNES Tool is more positive than a D.S.T., but the potential of the LYNES Test does not stop there. Stimulation treatment is a normal progression of this test—then further Swab Testing.

Many operators do not D.S.T. where results are expected to be questionable. They drill to T.D., then come back up hole testing all shows.

Single element tools can be opened above or below and straddle tools can be opened above, below or in between. LYNES Inflatable Tools can be reset anywhere in hole without tailpipe or formation anchor.

LYNES Inflatable Packers have endless variety of uses in testing, treating and production operations in the field. The inflatable sealing element will expand up to twice its run-in size to effectively seal in open hole or casing and will hold high differential pressures from above or below.

Ask your LYNES man to explain the many uses of LYNES packers to save you money on your well completions.

LYNES, INC.

P. O. Box 12486 Houston 17, Texas

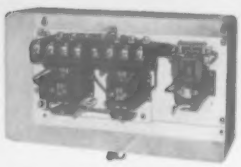
SALES LOCATIONS

Pampa • Midland • Wichita Falls
Oklahoma City • Carmi • Prestonburg, Ky.
Mt. Pleasant, Mich. • Calgary • Edmonton

Your A-B Handy Catalog Lists These Control Devices Often Considered "Special"

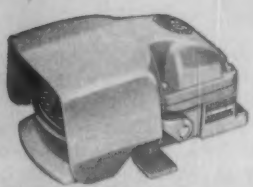
BULLETIN 840
Float Switches

These quality switches are available in a wide range of types for automatic control of motors operating tank or sump pumps. The snap-action switch mechanism assures positive operation, no matter how slowly the liquid level changes.



BULLETIN 1270
Automatic Transfer Switches

These switches are designed to transfer power-load to standby supply when normal power fails or drops too low. Automatically returns load to normal supply when power is resumed. Mechanically interlocked.

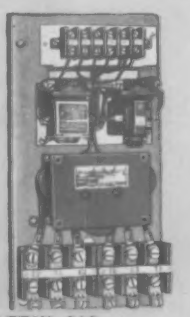


BULLETIN 805
Foot Switches

Ruggedly built to withstand the most severe industrial usage. Snap-action switch mechanism features maintenance free silver contacts. The foot switch shown above assures complete "safety" for the operator. Also made without top guard.

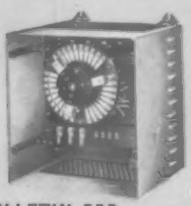
BULLETIN 836
Pressure Controls

For machine tool hydraulic systems operating at pressures up to 5000 psi. Oiltight enclosure. Operating pressure and differential are adjustable. A visible indicator shows trip point. Maintenance free silver contacts.



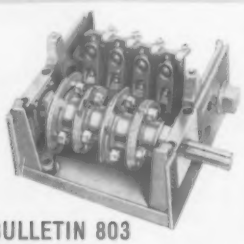
BULLETIN 812
Phase Failure—Phase Reversal Relays

Style F relay (above) protects against all open phase conditions on a branch motor circuit. Style R disconnects the motor upon a phase reversal. Style RF gives phase failure and phase reversal protection.



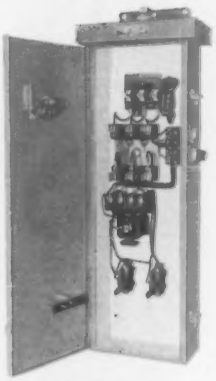
BULLETIN 555
Speed Regulators

Provide manual speed control of wound rotor motors for either fan or machine duty. When used with magnetic starter, the first step closes control circuit.



BULLETIN 803
Rotating Cam Limit Switches

Heavy-duty controls for use on automatic production machines. Made with up to 12 independent circuits which can be separately adjusted for operation at any point of rotation.



BULLETIN 1232
Pump Control Panels

Complete units for automatic operation of irrigation and oil well pumps. Employ standard A-B Bulletin 709 magnetic starter with manual disconnect switch or circuit breaker in weatherproof enclosure. Wide variety of optional features available.

BULLETIN 365
Multi-Speed Drum Switches

Designed for manual starting, speed changing, and reversing of polyphase multi-speed motors. Made for up to four speeds either non-reversing or reversing.

ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

Allen-Bradley Co., 1304 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

NEW Butterfly Valve!

MATCHLESS LUNKENHEIMER QUALITY

FIG. 4026N

Complete Valve with Ends on Casting.
2"-6".
Screwed End.

FIG. 4150N

(Rubber-Lined Fig. 4151R) Valve Elements Only.
2"-18". Screwed, Welded, Grooved, or Flanged Ends Supplied Separately to Fit Your Pipe Connections

W. P. 150 psi.

- QUICK OPENING
- POSITIVE CLOSURE
- NICKEL-PLATED CAST IRON
- STAINLESS STEEL TRIM
- "O" RING SEALS

New Lunkenheimer Butterfly Valves are compact and lightweight, easy to install on any line in a fraction of the space required by standard gate or plug valves. A quarter-turn of the stem opens the disc full or closes it tight. No lubrication is required, and "O" Ring seals provide positive shut-off in either vacuum or pressure service. These new Butterfly Valves are made to traditional Lunkenheimer standards of quality. WRITE for new Catalog 613 or call your Lunkenheimer distributor today for full information on the new Lunkenheimer Butterfly Valve line . . . available now for immediate delivery.

L-361-23

LUNKENHEIMER®

Multiple-strand prestressing —
Unless each strand carries its fair share of the load, multiple-strand roller chain may fail under the tremendous tensions and grueling conditions common to hard-working oil field drives. That's why Link-Belt's prestressing is so vital. Prestressing seats and cold-works the chain joint parts . . . assures equal load distribution across the chain, reduced elongation in service . . . adds extra measure of reliability.

Exact heat-treat control—
To produce roller chain of utmost uniformity, Link-Belt maintains exacting control of all heat-treating processes. With equipment and instrumentation exactly tailored to the need, all processes are carefully adjusted to suit the characteristics of each heat and analysis of steel. Result: roller chain of uniform strength *well above accepted standards* . . . chain that delivers full power under continuous heavy going.

Optical comparator inspection—
Precision is *rigidly practiced* in every step of Link-Belt's roller chain production. The optical comparator, capable of magnification up to 100 times, is an example of the specialized equipment used to assure precise manufacturing control of chain parts and tools. Under its powerful magnification, Link-Belt chain parts and the tools that make them are continually checked to guard against flaws.

Manufacturing extras that add up to...

High speed cyclic tension test— With its Fatigue Resistant FR* process, Link-Belt increases roller chain's endurance limit by compressing the metal around pitch holes . . . the critical sidebar areas most vulnerable to fatigue failure. On the test equipment above, Link-Belt has verified the superior fatigue resistance imparted by the FR process. The machine produces up to 65 tons of high speed cyclic tension . . . duplicates toughest conditions of rig operation.

*U.S. Patent No. 2,517,497

Shown here are just a few of the many *manufacturing extras* that contribute to the greater strength and endurance of Link-Belt FR (Fatigue Resistant) roller chain. Combined, these features assure you of precision chain that can withstand the smashing impacts and tortuous stresses met in day-to-day drilling.

Other advantages of Link-Belt FR roller chain include: SHOT-PEENED ROLLERS—specially cold-worked for extra life; SHEPHERD'S CROOK COTTERS—designed to remain in place despite severe vibration; SPECIAL BOXING—provides positive protection against dirt and moisture.

For engineering assistance in applying FR roller chain, write Link-Belt Company, Indianapolis 6, Indiana. And ask any leading supply store for Catalog 2980 . . . it contains full information on roller chain and other Link-Belt oil field equipment.

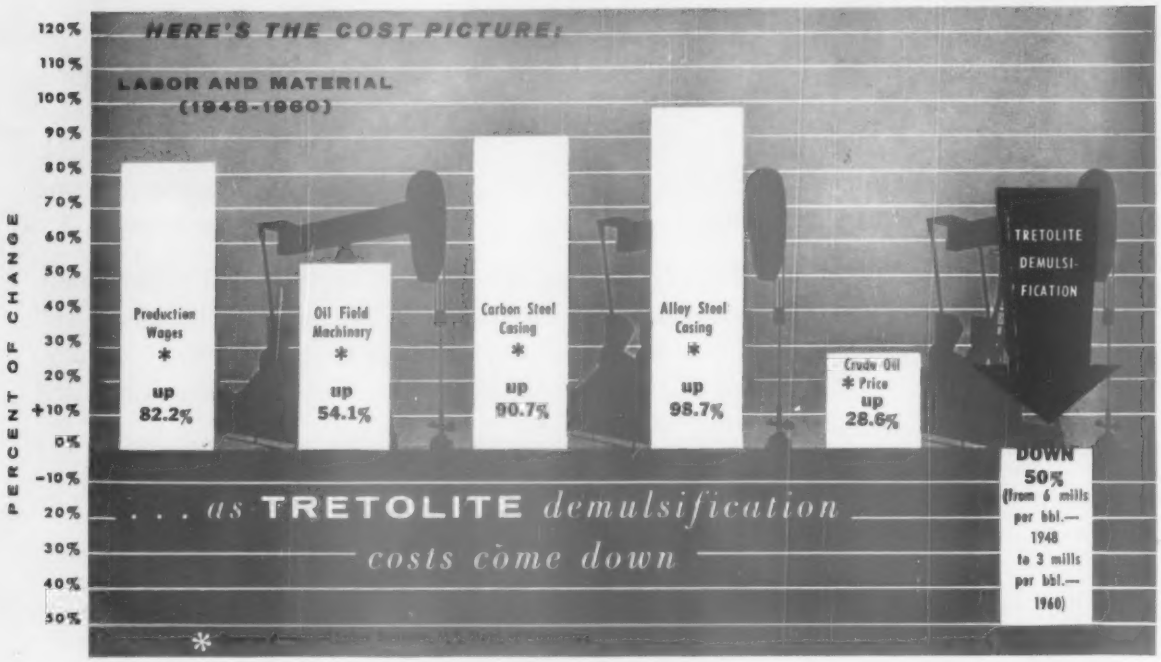
LINK-BELT

ROLLER CHAINS AND SPROCKETS

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 26, Odessa, Tex., New Orleans 16, Shreveport, La., Los Angeles 22 (Montebello), Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields. 15,679

another
TRETOLITE SERVICE
report

OIL PRODUCTION COSTS ARE STILL GOING UP



. . . and here's the reason:

It's good news in a period of general spiraling costs—the average cost of Tretolite demulsification treatment has been *cut in half* as other production costs have continued to move stiffly upward!

Why? A major part of the answer lies in Tretolite research . . . a continuing program devoted to the development of newer and better formulations, to constant testing, and to improved methods of manufacture.

If you're caught in the cost squeeze, and would like to produce more salable oil at less cost, we invite you to contact your Tretolite Field Service Engineer (the "Man in the Red Car") for helpful cost-cutting suggestions.

Write now for your copy of the new TRETOLITE DEMULSIFIER BROCHURE

IT'S YOURS ON REQUEST.

PETROLITE CORPORATION

SUBSIDIARY AND AFFILIATED COMPANIES

CANADA, Edmonton, Alberta • ENGLAND, London
GERMANY, Frankfurt, a. M. • VENEZUELA, Caracas

TRETOLITE COMPANY
DIVISIONS

REPRESENTATIVES

ARGENTINA, Buenos Aires • BRAZIL, Rio de Janeiro • COLOMBIA, Bogota • ITALY, Rome • JAPAN, Tokyo • KUWAIT, Kuwait • MEXICO, Mexico, D. F. • NETHERLANDS, The Hague • TRINIDAD, Port of Spain

T-61-1

Oilfield Contractor Frank Turinsky has 20,500 pounds push with his TD-15 Oil Field Special crawler—for fast clearing, digging hard materials, and doing other location jobs. Blade of the 8-foot-wide, outside push-arm dozer is sized to speed pit-digging—"beefed" and braced for tough conditions.

Five-minute "move-outs" are easy for TD-15-equipped contractor Turinsky to make—to hit several locations fast and do them in a hurry. Rig is ready to roll—legally—without "permit" red-tape! Standing, left to right, are Frank Turinsky, and son, Frank, Jr.

"My TD-15 has small tractor advantages yet outdozes anything in the oil fields"

—Frank Turinsky, Mounds, Oklahoma

"This International TD-15 Oil Field Special is the tractor I have always needed," states Contractor Frank Turinsky, Mounds, Oklahoma.

"The 8-foot over-all width is so important in digging pits and hauling legally. I've been using smaller tractors—trying to stretch their ability to 'sub' for a big machine.

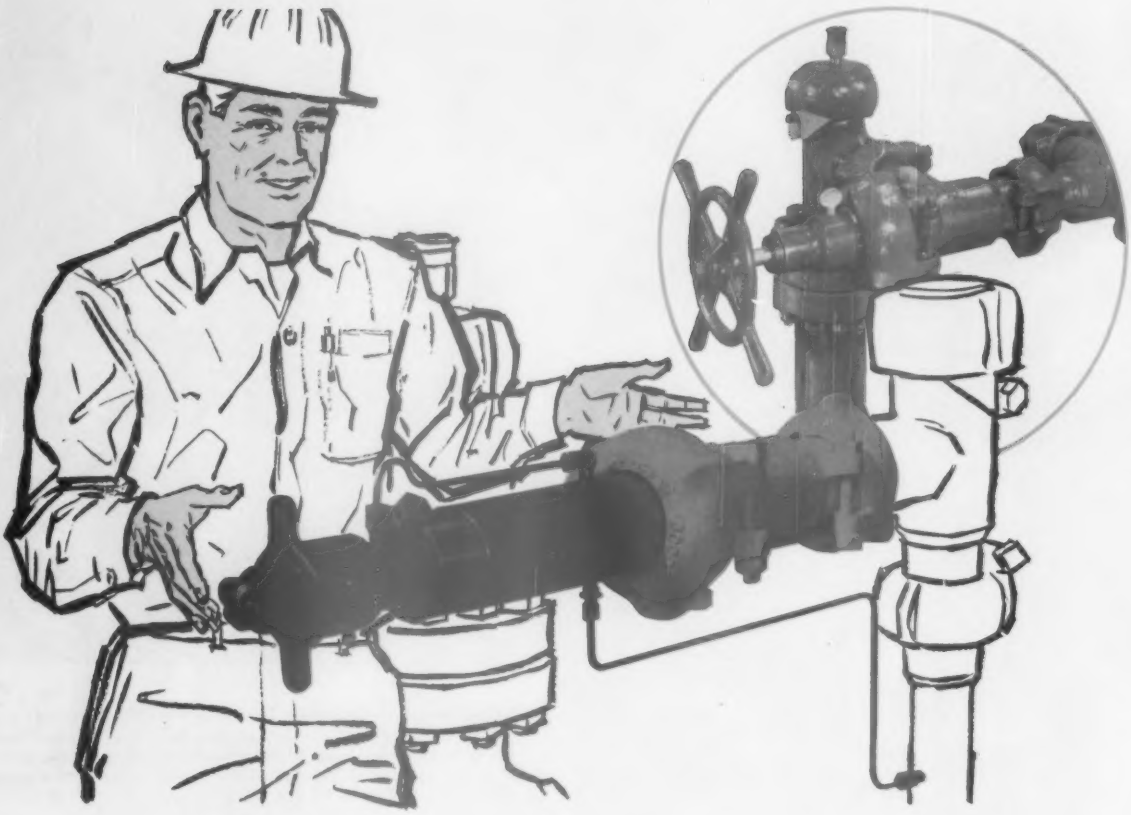
"Now we have a tractor that retains all small tractor advantages, yet outworks any other oil field 'dozer.

"We can make money on the small jobs because the TD-15 can move in fast and do them in a hurry—and no job is too big for the '15' to handle with ease."

Prove you can outwork and outearn "the others"—with the TD-15's 20,500 pounds push. See how the 6-speed, full-reverse transmission with single-stick and Shuttle-Bar Control, teams with the fast-slugging, 6-cylinder-smooth TD-15's Diesel engine. Prove 62-inch-gauge stability, maneuverability, and easy truckability. Let your International Construction Equipment Distributor demonstrate.

International® Construction Equipment

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Ill.
A COMPLETE POWER PACKAGE



How to make the best Christmas tree a whole lot better

old trees: Convert your Unibolt Wing Valves to Unibolt Pressurematics by replacing the stem/bonnet assembly with the Pressurematic unit.

new trees: Specify Unibolt Pressurematic Wing Valves. They give you high/low safety plus a shut-off for choke changing.

Here is a valve that does the work of two valves yet costs little, if any, more than a good high pressure valve alone. It operates manually for choke changing, or automatically as a high-low safety valve.

The UNIBOLT PRESSUREMATIC VALVE combines all of the time-tested and proven features of the Unibolt Adjustable Wing Valve with a novel automatic actuating accessory. The valve closes instantly when a predetermined pressure balance across the seat is disturbed. The actuating mechanism consists of a small piston which is exposed to well pressure and a larger piston which is exposed to flowline pressure. A broken flowline or open valve, for example, in the production system, would lower the flowline pressure and thus instantly close the valve. Inversely, a rise in the flowline pressure, for any reason, would cause the valve to close. Once closed, the valve may be easily opened and set manually for automatic operation.

Send for literature or contact your nearest UNIBOLT sales representative.

UNIBOLT

THORNHILL CRAVER CO.

P. O. Box 1184, Houston, Texas

Reagan County, Texas *Ward County, Texas* *Monument Field, New Mexico*

how helpful?

You get more than lead antiknock compounds when the Du Pont tank car rolls into your company's refinery. You get marketing help, such as the "Profile of the Motorist" study, the expand-the-demand movies "Down the Road" and "Highway Holiday" plus training aids of several types. These are just a few of the bonus advantages of doing business with Du Pont.

E. I. du Pont de Nemours & Co. (Inc.), Petroleum Chemicals Division, Wilmington 98, Delaware.

LEAD ANTIKNOCK COMPOUNDS and other PETROLEUM ADDITIVES

DU PONT
REG. U. S. PAT. OFF.

Better Things for Better Living . . . through Chemistry

by
no other
method,
short of
a costly
completion,
can you be
sure of the
commercial
value of a
formation.

A WORLD OF EXPERIENCE

JOHNSTON TESTERS

DST to be sure!

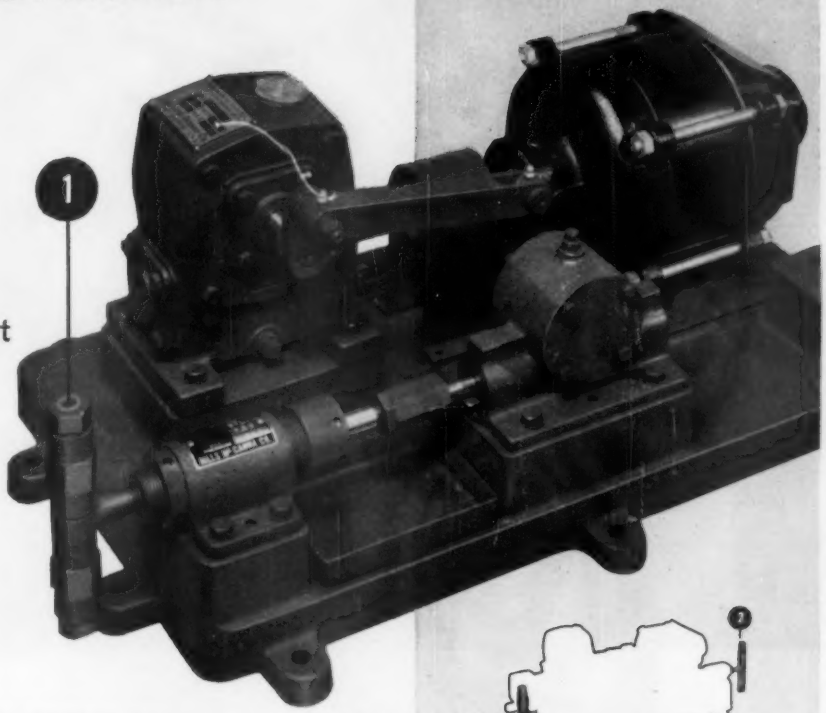
HOUSTON, TEXAS
CALGARY, CANADA

HILLS-McCANNA

Add-on

Metering Pumps

let you buy only what you need today... add to it tomorrow if your requirements change



Hills-McCanna Model "U" pump, single feed

When you buy a Hills-McCanna metering pump, you are buying appreciable built-in protection against obsolescence caused by changing process requirements.

Add-on construction makes it possible to modify pumps already in the field. Feeds can be added as illustrated. Optional micrometer screw stroke adjustments to permit change in feed rate while the pump is operating can be installed. Standard heads can be replaced with jacketed liquid ends for pumping materials requiring refrigeration or heat. Diaphragm liquid ends can be supplied to replace plunger-type liquid ends. All-plastic liquid ends (Penton or PVC) can be supplied. Automatic controls can be added. Variable speed arrangements are available.

No matter what your chemical metering or proportioning application, you'll be money and satisfaction ahead with versatile, reliable Hills-McCanna pumps. The line is complete—capacities from 0.10 to 980 gph, pressures to 30,000 psi.

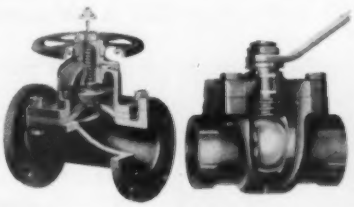
For specific recommendations, write today for literature, outlining your particular requirements.

. . . a second feed can be added to a pump with a two-feed base

. . . or a second, third, or fourth feed can be added to a pump by using a four-feed base

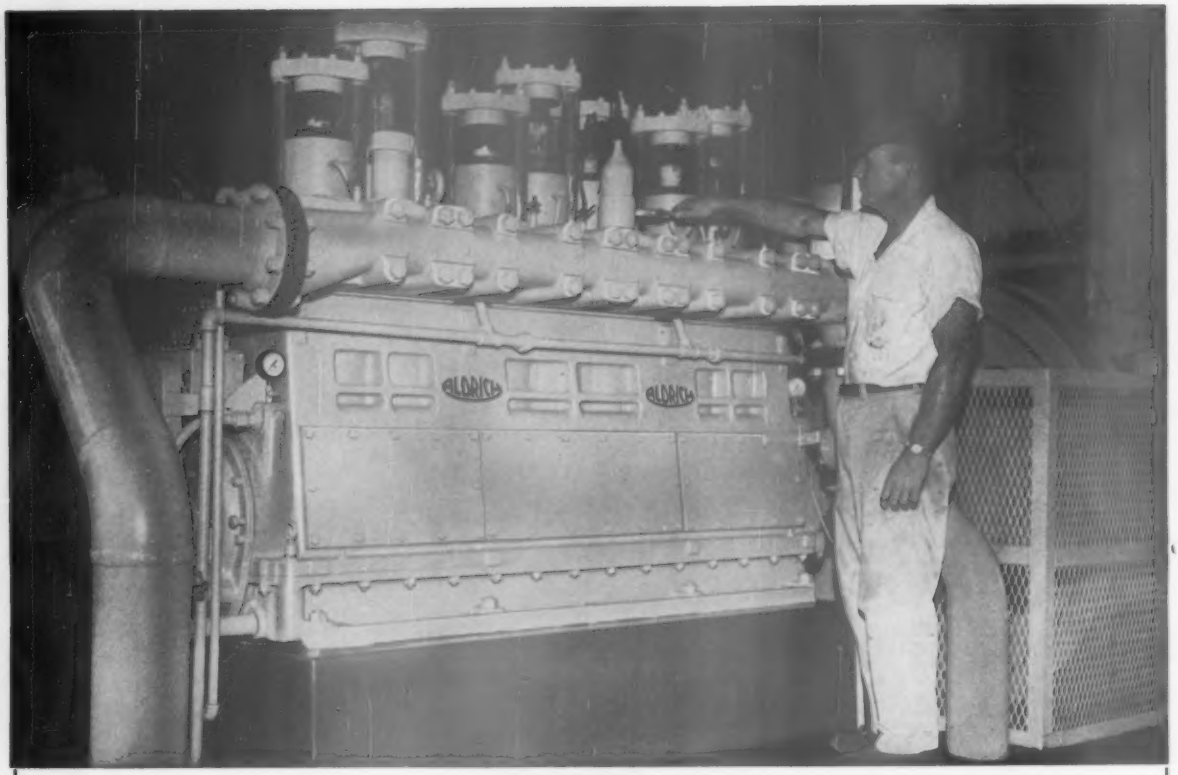
Optional micrometer screw stroke adjustment can be added at any time

Hills-McCanna also manufactures a complete line of diaphragm valves 1/2"-16"; ball valves 1/4"-12"; and magnesium alloy castings.



HILLS-McCANNA COMPANY

400 MAPLE AVENUE • CARPENTERSVILLE, ILLINOIS



FIELD REPORT

FLOOD: Pegasus Unit
OPERATOR: Mobil Oil Company
PUMPS: Two Aldrich Septuplex
FLOODING STARTED: February, 1955
EXPERIENCE TO DATE:

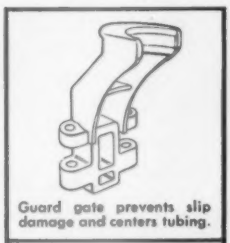
Pumps continuously deliver brine to two formations — 90 gpm at 2,500 psi; 150 gpm at 1,000 psi. Customer reports: "Routine maintenance only. Aldrich pumps were selected because of previous dependable and economical service under high pressure operations."

Field Parts stock available in Houston, Odessa, Alice and Wichita Falls, Texas; Casper, Wyo.; Hobbs, N. M.; Carmi, Ill.; Charleston, W. Va.; Tulsa, Okla.; Los Angeles, Calif.; Calgary, Ontario. For further information write the ALDRICH PUMP COMPANY, 9 Gordon Street, Allentown, Pa.

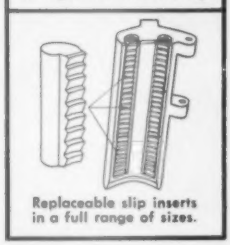
the toughest pumping problems go to ALDRICH

TYPE F1 TUBING SPIDER

Engineered by Guiberson for present day requirements



Guard gate prevents slip damage and centers tubing.

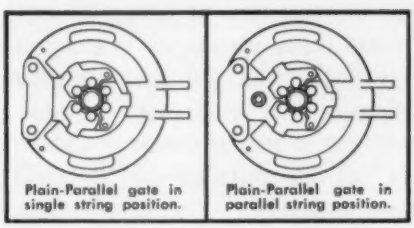


Replaceable slip inserts in a full range of sizes.

Fast, safe, one-man operation.
Strong, trouble-free design.
Choice of gates at no extra cost.
Multiple pipe-size slip bodies.

You can handle any length of tubing string in utmost confidence with the heavy duty **F1** tubing spider. Design features include a wide safety margin of built-in strength . . . fast, efficient, one-man, hand or foot operation . . . and three point slip contact for automatic alignment and even load distribution. Optional at no extra cost is a guard gate which centers tubing and protects the slips or a reversible plain-parallel gate which handles a single string in one position or parallel strings in the other.

Multi-size slip bodies offer added economy and convenience. The 1″ slip body accommodates ¾″ or 1″ slip inserts. The 2″ body handles 1¼″, 1½″, 1¾″ or 2″ inserts. The 2½″ body handles 2″ or 2½″ inserts and a 3″ body with 3″ inserts is also available. Slip inserts are easily changed and economically replaced when necessary. Dependability, durability and versatility class the **F1** as today's outstanding buy in tubing spiders.



Plain-Parallel gate in single string position.

Plain-Parallel gate in parallel string position.

Better be Safe than Sorry — go Guiberson

THE GUIBERSON CORPORATION
DALLAS, TEXAS, U. S. A.

SAFE THAN SORRY BETTER BE GUIBERSON

PRODUCTION, DRILLING AND WORKOVER SPECIALTIES, MOLDED RUBBER PRODUCTS

ONE OF THE DRESSER INDUSTRIES

DRESSER INDUSTRIES INC.

OIL • GAS • ELECTRONICS
CHEMICAL • INDUSTRIAL

PRECISION MAKES THE DIFFERENCE

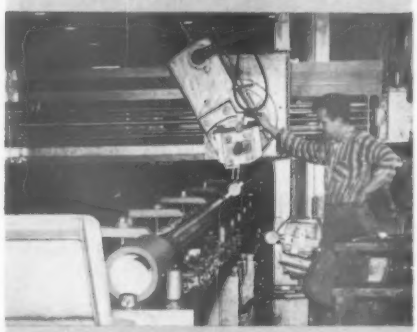
AT AVONDALE OIL TOOLS

Add the know-how of skilled Avondale craftsmen to the finest specialized machine tools in the Gulf South, and you have **precision**—the **big-difference** that keeps your valuable equipment operating at peak efficiency. Avondale Oil Tools is not just one operation—but represents the combined capabilities of the entire Avondale organization—hull and structure repair at the Harvey Yard, machined castings at Service Foundry, new construction and repair at the Main Yard.

Precision, service, capability are at your service at Avondale Oil Tools.

Machining grooves for stainless steel insert in blowout preventer.

Repairing worn hydramatic brake.

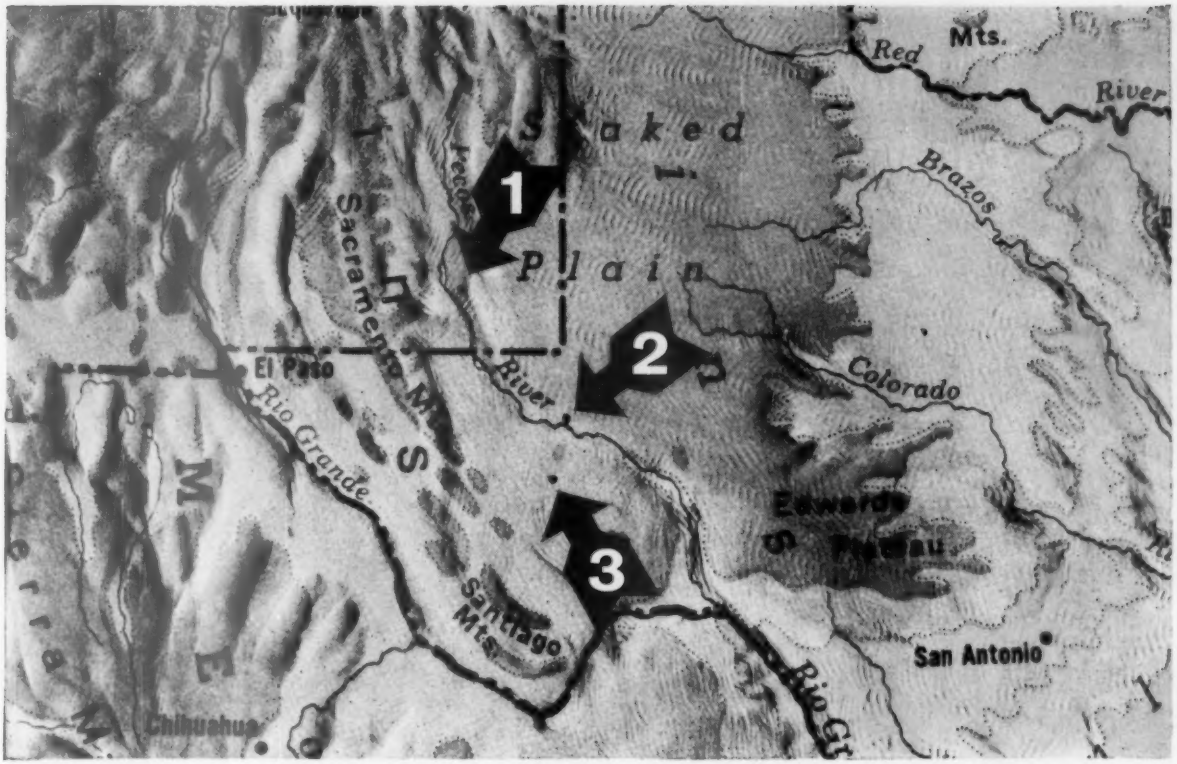


Machining Kelly to original dimensions on 40' stroke planer.

AVONDALE SHIPYARDS, INC.

HARVEY QUICK REPAIR DIVISION

P. O. BOX 116, HARVEY, LOUISIANA • PHONE FIllmore 1-4211



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calcium sulfate scale problems . . . solve them with

HAGAN CONTROLLED SOLUBILITY PHOSPHATES

Waterflood producers in "gyp" country have a real problem. Brines high in calcium sulfate precipitate needles of gypsum at the slightest change in water pressure or temperature. Formations, downhole equipment and heater-treaters get clogged and production costs shoot up. Hagan Controlled Solubility Phosphate, 15-J, has solved this problem, turned loss into profit in these typical cases:

1 A field in Southeastern New Mexico was placed under flood in 1958. The shallow producing wells, which had all been completed open hole and shot, plugged solid with "gyp" in less than six months. Oil production dropped off and the flood was in danger of abandonment. The operator decided to try Hagan's 15-J, Controlled Solubility Phosphate. A trial well was cleaned out and packed with 15-J. After three months of sustained production with no pulling jobs, the operator was convinced and went to field-wide treatment with 15-J.

2 In a field in West Texas, heavy "gyp" deposits formed in the treaters. Heat transfer was reduced and costly fire tube replacements became necessary — as often as every three months.

By-pass feeders were installed a few hundred feet ahead of the treaters and charged with 100 pounds of 15-J for each 500 BWPD handled by the treaters. Once each month the treaters are given a 35-pound booster charge. After nearly a year the result has been trouble-free treater operation and a sharp reduction in costs.

3 The type of injection water used and the formation being flooded in another West Texas field pointed to serious "gyp" problems. Conditions were so bad on one lease that total produced fluid dropped from 500 bpd to 50 in less than one month as "gyp" sealed off the formation. Working over the wells on this lease became so expensive that abandonment was considered until Hagan's Controlled Solubility Phosphates were put to work.

The use of carefully-sized, long-lasting, sodium calcium fracturing phosphate proved successful in four wells. The fifth, which could not be fractured, was treated downhole with two pounds of 15-J per week. Each pound of Controlled Solubility Phosphate used earned the operator over $20.00 during the first year. In addition, hundreds of additional barrels of oil were produced.

For information on how Hagan's complete line of Controlled Solubility Phosphates can help you, write or phone the address below.

HAGAN—Your only complete source of water conditioning equipment, water treatment chemicals, field laboratories, engineering service.

HAGAN
CHEMICALS & CONTROLS, INC.
HAGAN CENTER, PITTSBURGH 30, PA.

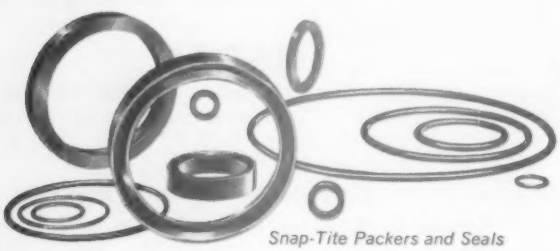
HAGAN OILFIELD OFFICES: Bradford, Huntington, Evansville, Little Rock, New Orleans, Tulsa, Houston, Abilene, Midland, Denver, Casper, Los Angeles. In Canada: Edmonton and Toronto.

A complete choice of packers and seals permits Snap-Tite quick-disconnect couplings to handle over 600 different fluids! *(some of them mighty tough)*

Whatever fluid you're working with, chances are Snap-Tite couplings can handle it. Because every-one of the thousands of Snap-Tite quick-connect valved couplings comes with a wide choice of rubber packers and seals, selected according to the fluid in use. The right choice, of course, is vital for the seal is the very heart of the coupling.

To assist you in the proper selection of coupling seal material, Snap-Tite, with the assistance of suppliers of synthetic rubber materials, has recently compiled a comprehensive Packer Usage Guide —the first of its kind in the industry.

For the Packer Usage Guide, and for complete information on the correct choice of quick-connect, quick-disconnect couplings for the fluids *you* use, write Snap-Tite, Inc., Union City, Pa.



Snap-Tite Packers and Seals

Snap-tite

UNION CITY, PA.

ST-61-02

K-8120

3 fluids open the way to better frac jobs and faster pay out!

HUMBLEFRAC®

1. HUMBLEFRAC CONCENTRATE—a unique *liquid* fluid-loss additive easily measured into the fracturing oil to get the optimum blend. Contains no solids that could cause plugging or other formation damage. Frac fluid return is quick . . . more fluid is left in the fracture, extending it and allowing good sand propping.

2. HUMBLEFRAC BASE OIL—offers high sand-carrying ability even under extreme temperature and pressure, yet is easily handled at lower temperatures.

3. HUMBLEFRAC FRACTURING FLUID—ready-to-use mixture of concentrate and base oil, custom-blended to your specifications.

FOR COMPLETE TECHNICAL INFORMATION, call your Humble salesman or contact Humble Oil & Refining Company, Houston, Texas.

HUMBLE OIL & REFINING CO.

America's Leading ENergy COmpany

ENCO PRODUCTS

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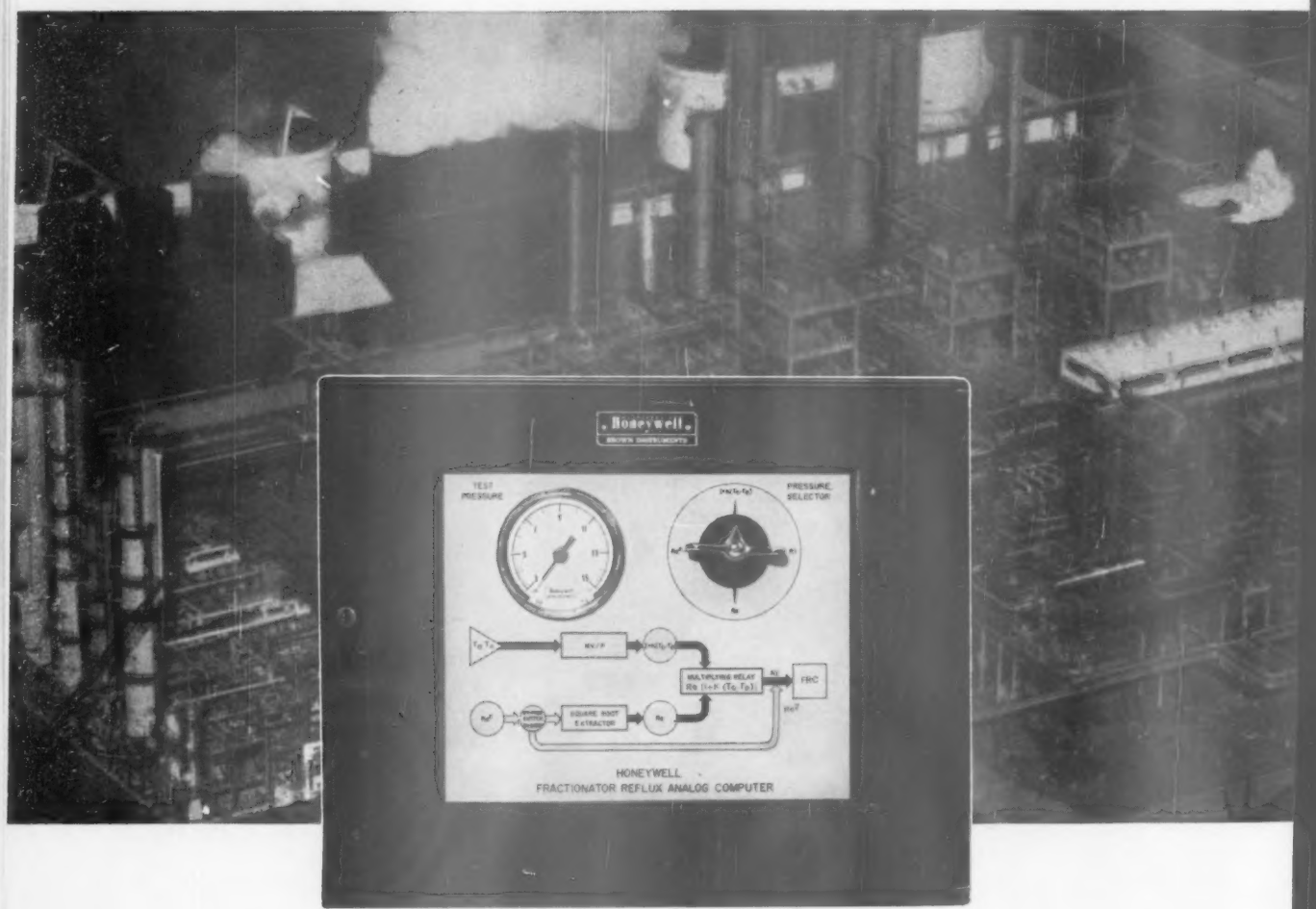
Stabilize Fractionating
with new Honeywell



HONEYWELL *FRAC* CONTROLLER IS EASY TO USE AND MAINTAIN

- Standard Honeywell components, packaged in a standard Honeywell strip chart recorder case—completely wired and internally piped.
- Only four simple, easily accessible process connections required to put the unit in operation.
- Chassis pulls out for front-of-case servicing, simplifying adjustment and maintenance for your instrument technicians.

COMPONENTS

MV/P (millivolt-to-pressure) Transmitter

- Fully transistorized
- Continuously sensitive to temperature change
- Constant voltage supply
- Simple span and zero adjustments

Pressure selector and test pressure gage

- Provide check of all pneumatic pressures within the computer for simplified trouble shooting.

By-pass switch

- Permits switching from *FRAC* control to conventional external reflux flow control.

Column Operation

*FRAC** Controller

- **Easily installed and maintained by present instrument technicians**
- **Savings realized justify installation**
- **Tamper-proof design**

This new Honeywell control system immediately adjusts column operation to the effects of ambient temperature on overhead product condenser and external reflux. It continuously computes internal reflux flow, to maintain the most efficient, economical fractionating tower operation.

The new method, originally developed and licensed by Phillips Petroleum Company, utilizes a simple Honeywell analog computer employing standard Honeywell electric and pneumatic instrument components.

By correcting instantly for temperature deviation, the new control system offers the following economies.

- Less reboiler heat is required, because large surges of internal reflux that would lower temperature are eliminated.
- Reduction in off-specification product minimizes re-runs and the need for intermediate storage.
- Closer control permits fractionator to operate closer to the flooding point.

Get complete details from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

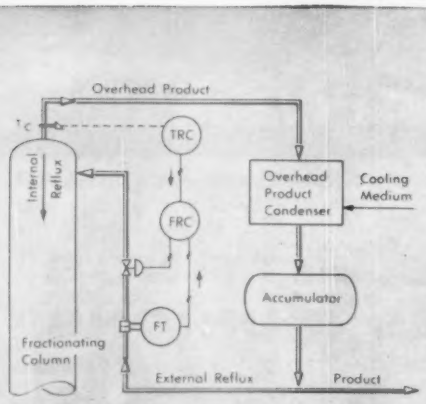
MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

**Fractionator Reflux Analog Computer. Trademark, Minneapolis-Honeywell Reg. Co.*

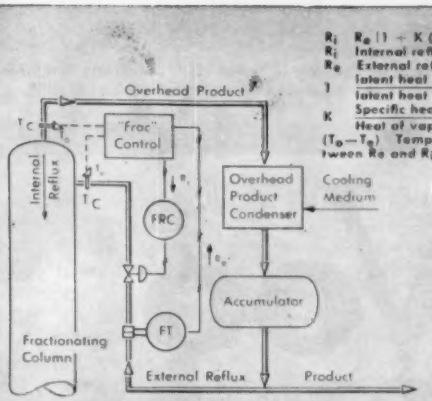
Honeywell

First in Control

SINCE 1885



PROBLEM with existing fractionator control systems—Column is upset when temperature of external reflux is indirectly affected by changes in atmospheric conditions or in the temperature of the cooling medium to the condenser. Result: off-spec product, wasted reboiler heat, lower fractionator capacity.



R_i $R_e\,(1) + K\,(T_o - T_e)$
R_i Internal reflux
R_e External reflux
1 Latent heat of vaporization of R_e / Latent heat of vaporization of R_i
K Specific heat of R_e / Heat of vaporization of R_i
$(T_o - T_e)$ Temperature difference between R_e and R_i

SOLUTION: *FRAC* Controller (1) measures external reflux flow rate (R_e) and the temperature difference between the overhead product (To) and the external reflux (T_e); (2) computes internal reflux flow rate (R_i); and (3) holds it constant by adjusting external reflux flow rate for efficient fractionator operation.

Another* Exclusive Vogt Product

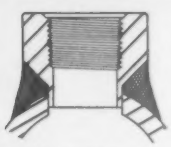
FORGED STEEL WELD COUPLETS

THREADED TYPE

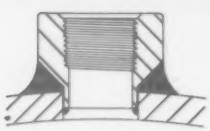
SOCKET WELD TYPE

*with Exclusive Vogt "WELD RING"

The Vogt Weld Couplet is an easy-to-install fitting for branch connections from pipe, vessels or tanks. It replaces more-difficult-to-install welding bosses, couplings and the type of fittings requiring trimming or matching to fit contour of vessel or pipe.



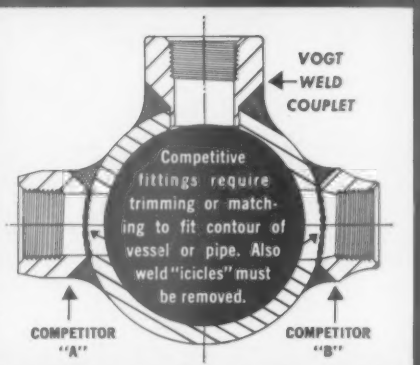
Small Diameter Pipe



Large Diameter Vessel

Vogt Weld Couplets adapt to any pipe or vessel curvature by simply adjusting the height position of the couplet when welding. This characteristic means easy installation, positive positioning and alignment, a stronger weld without distortion, and no inside "icicles" of welding material.

Couplets are available in carbon steel, conforming to A.S.T.M. specifications. Other materials can be supplied on special order.


VOGT
WELD
COUPLET
Competitive fittings require trimming or matching to fit contour of vessel or pipe. Also weld "icicles" must be removed.
COMPETITOR "A"
COMPETITOR "B"

Write for Folder SWC-1 to Dept. 24A-FO.

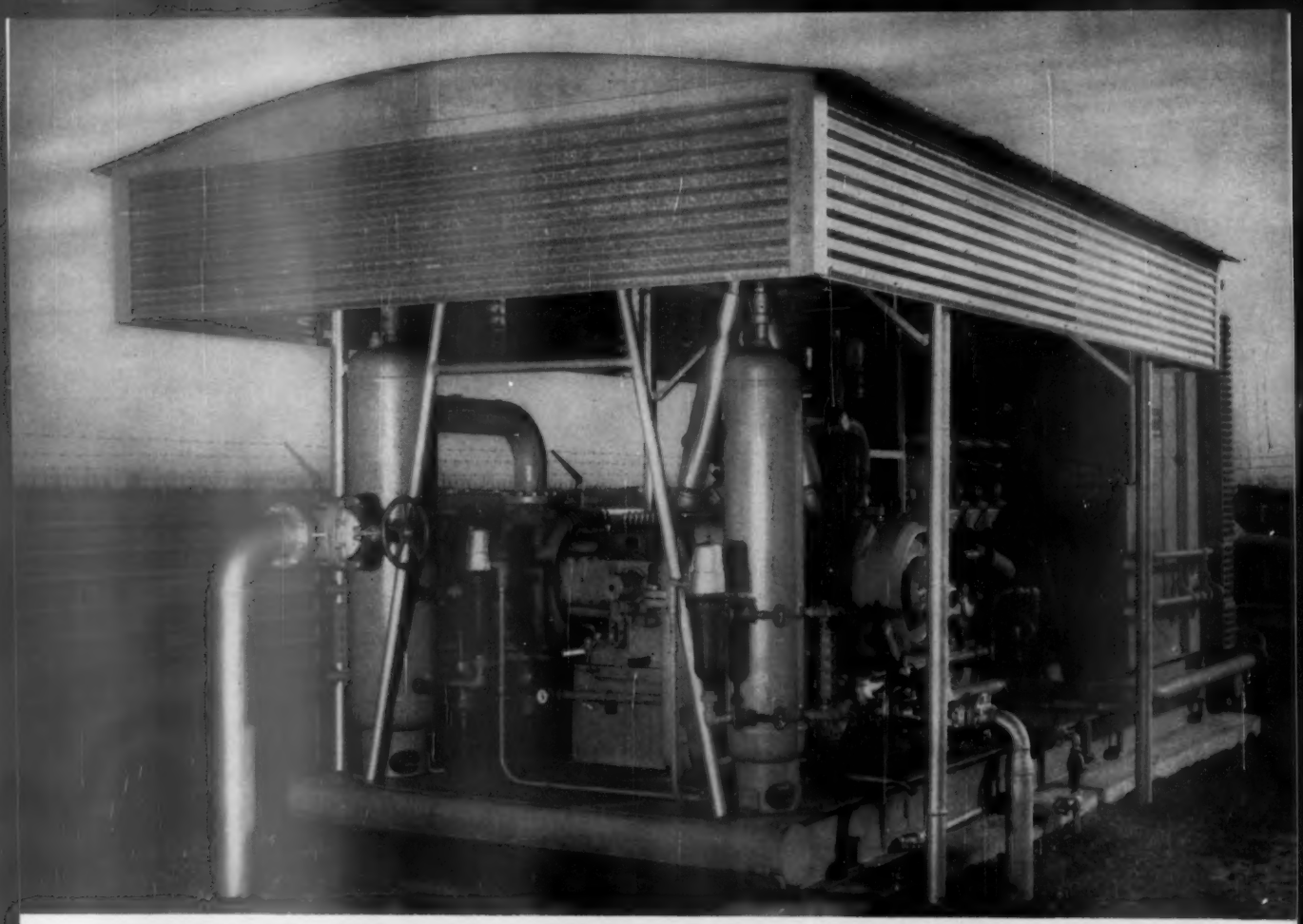
Vogt VALVES, FITTINGS FLANGES & UNIONS

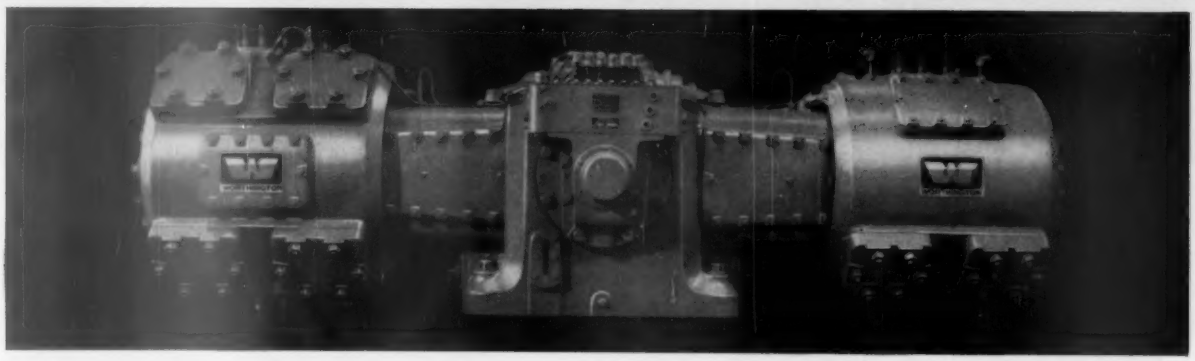
See our complete line in Catalog F-10

HENRY VOGT MACHINE CO., P. O. Box 1918, Louisville 1, Kentucky

SALES OFFICES: Camden, N. J., Charleston, W. Va., Chicago, Cleveland, Dallas, Los Angeles, New York, St. Louis

For Direct Long Distance to Louisville dial: 502 ME 4-9411





SHOULD YOU TAKE GAS FROM A WELL?

There's a big difference in opinion about when it is profitable to take gas from a well. It depends on price contracts, on company policy of time limit on payout, on alternatives for capital investment and on other factors, such as the economics of the well itself. To lower your well cost picture, Worthington now offers the new CUB compressor.

Through a wide range of cylinder sizes, the CUB handles over 85% of gas field needs. The cylinders are designed for extremely fast field changes to meet changing capacities and pressures.

The CUB cylinder-and-piston arrangement is balanced-opposed. This cuts vibration to a level below other compressor designs. It reduces supporting base requirements and lengthens compressor life.

Main crankshaft bearings in the CUB are the more expensive, spherical-roller-bearing type. You'll find it runs with less friction, runs cooler, and maintains better full end-thrust control.

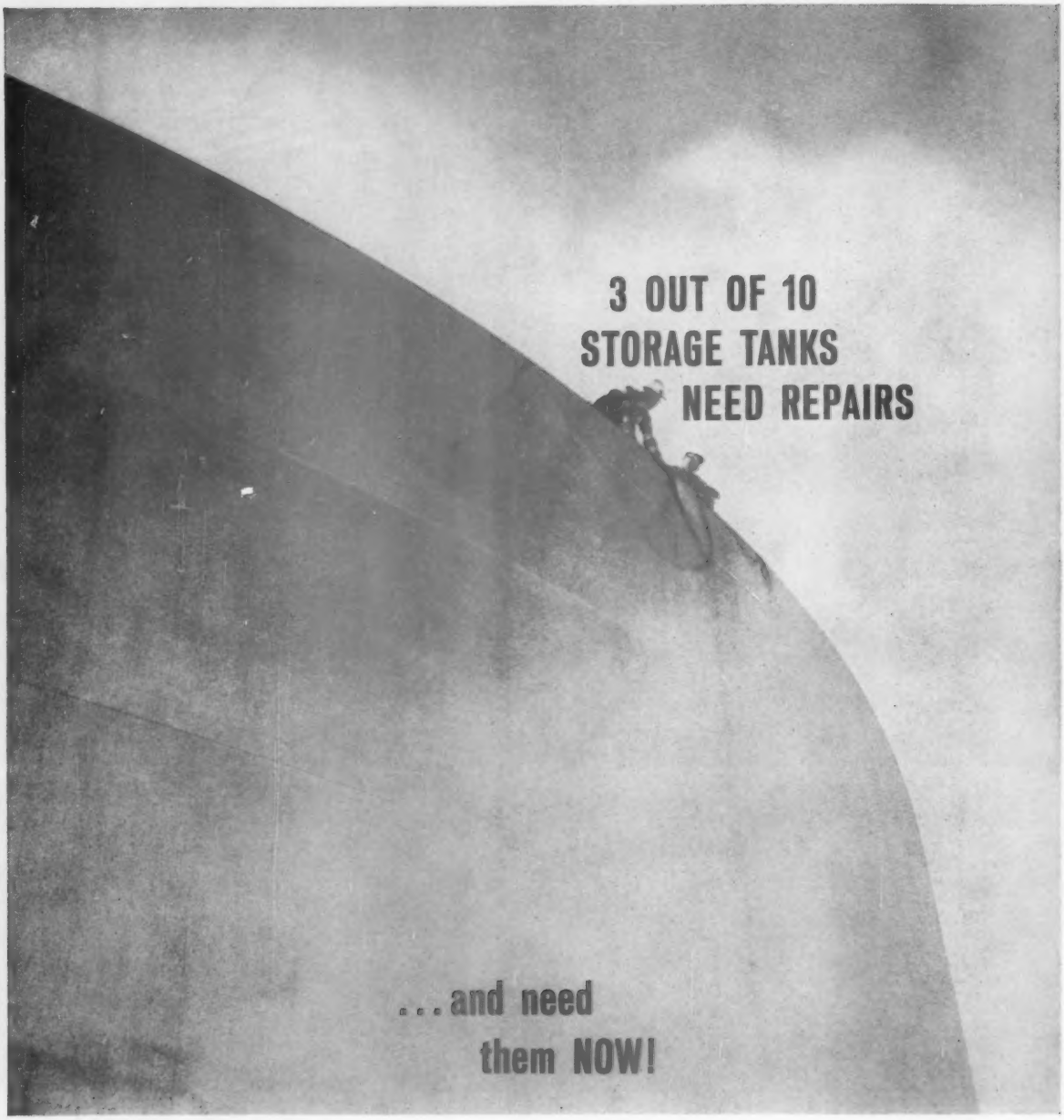
Lubrication in the CUB is improved, too. Oil is continuously cleaned by a built-in filter that is readily serviced without disturbing piping. All lubrication is done by a full, force-feed system. And crankcase oil is water-cooled down to a conservative operating temperature by an oil cooler enclosed in the frame itself.

You'll find, too, that the CUB is compact to make an easier installation. Piping is less, only one water inlet and two water outlets. There are no external oil pipe connections.

For more information on the CUB, write Worthington Corporation, Section 36-19, Harrison, N. J. In Canada, Worthington (Canada) Ltd., Brantford, Ontario. Or call your local compressor packager.

WORTHINGTON

PRODUCTS THAT WORK FOR YOUR PROFIT



How good (or bad) is your tankage?

An inspection may surprise you. Since Feb. 1st, Graver inspectors have examined a total of 349 storage tanks for a number of refiners and producers. More than 10% of these tanks needed major repairs. More than 20% needed lesser repairs. Many needed repairs *immediately*—in order to prevent total loss of the tank, or a major capital expense later on.

The fault is no one's. It's just that few companies have the time, the equipment or the personnel to do an efficient job of tank maintenance.

This is where Graver comes in. Our Free Inspection Plan enables you to get a 73 point check on all your storage tanks—FREE. Should repairs be necessary, Graver does the job quickly, expertly and at a competitive cost.

Graver is the *only* nation-wide Tank Repair and Maintenance Service. We have our own crews, our own special equipment. We come in, get the job done, and get out—with no interruption to your production schedule, no need for you to divert your operating forces to handle maintenance work.

Have you a tank problem?
Call Graver.

FREE TANK INSPECTION

Graver will make a thorough 73 point check on all your storage tanks and give you a detailed "Condition Report" on each one—*free of charge*. No obligation, of course.

Write for full information.

Graver — ONE OF THE UNION TANK CAR COMPANIES

Graver Tank & Mfg. Co.
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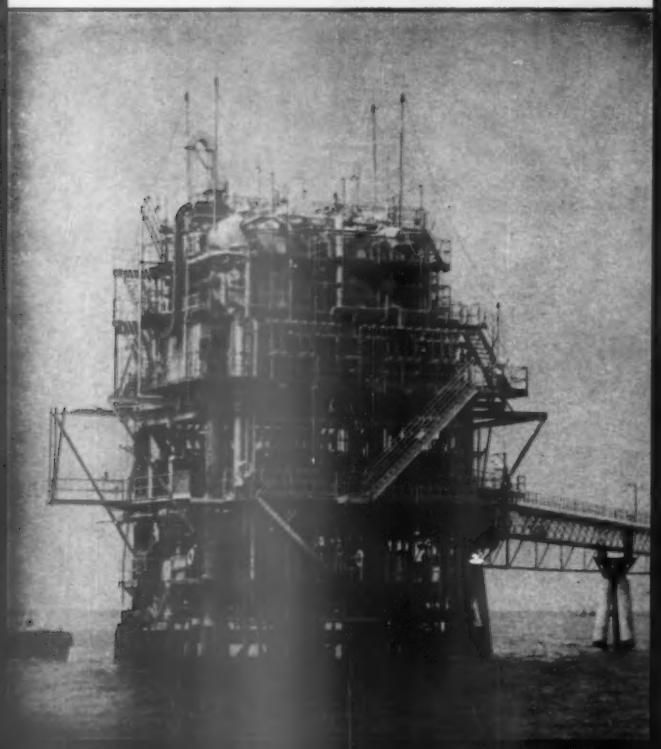
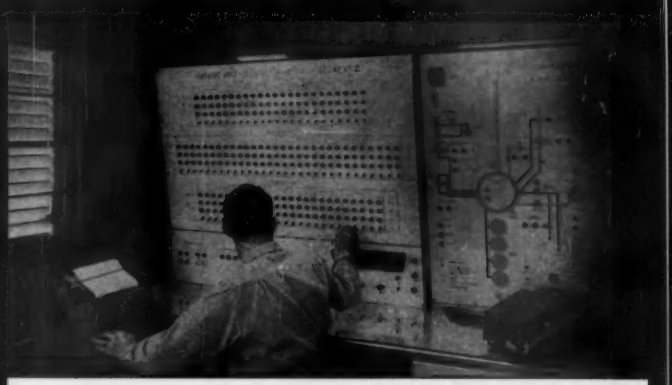
TI PROCESS CONTROL SYSTEMS

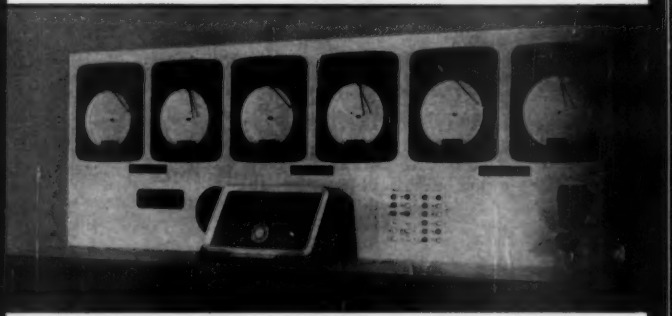
Automate Petroleum Production!

Unattended crude gathering station in Venezuela's Lake Maracaibo automatically controls production of 48 completions.





SACROC supervisory control system in West Texas automatically tests wells, records all data over entire 76-well project.



On-shore console supervises and controls automated offshore producing platform near Corpus Christi, Texas.

Electronic equipment designed, built and installed by Texas Instruments controls the *unattended* production of crude in locations throughout the world. In the Lake Maracaibo installation, for instance, TI's process control system monitors flow and pressure from each completion; monitors and controls all functions of flow station operation, including automatic start-up, shut-down and well testing; and throughout the entire 100,000 BPD operation logs complete records of production and testing into punched paper tape.

In case of a malfunction — for example, a pump or engine failure — the system analyzes the situation, takes corrective measures, and sends classified alarm information to the remote monitoring station by radio. A maintenance engineer can then go to the seat of the trouble without repeating corrective measures already taken automatically. TI has recently contracted to provide the electronic equipment on two similar flow stations in Lake Maracaibo.

For West Texas' SACROC field, *the country's largest unitized oil producing operation,* TI designed a supervisory control and data gathering system that provides automatic and manual control for testing any of 76 wells, returning it to production or shutting it in. Wells on test are subjected to gas, oil and water separation with resulting data printed out in the central console.

Texas Instruments experience and abilities in petroleum automation systems are being applied in many fields of industrial process control and automation. TI's capacity for design and application of precise instrumentation assures efficient handling of the most complex projects.

Write for complete information.

APPARATUS DIVISION
PLANTS IN HOUSTON
AND DALLAS, TEXAS

TEXAS INSTRUMENTS
INCORPORATED
3609 BUFFALO SPEEDWAY
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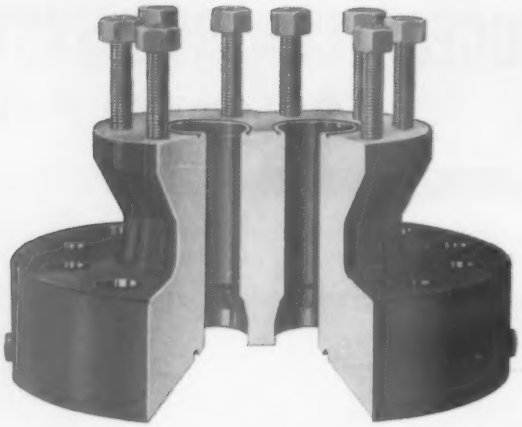
Rector
Multi-String Tubing Heads

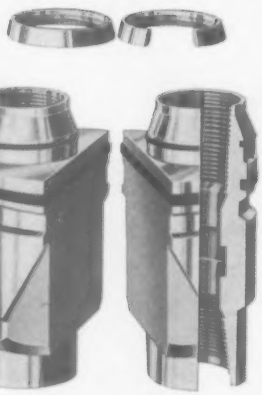
For Maximum Flexibility and Positive Control During All Multiple Completion Operations

From start to finish RECTOR Multi-String Tubing Heads allow full passage of packers and other tools to the oil string. Split hangers are automatically aligned in the head by fixed lugs . . . no guide pin necessary.

Tubing strings are run and landed without removal of blow-out preventers. Positive control of well is maintained by sealing elements on hangers and removable RECTOR-PSI circulating full opening back pressure valves during removal of blow-out preventers and installation of Christmas Tree. A special Rector multi-seal ring on each hanger insures positive steel seal for each tubing string.

Available through your favorite supply store or your Rector representative.





Rector

WELL EQUIPMENT CO., INC.

Making the Oil Industry Safer!

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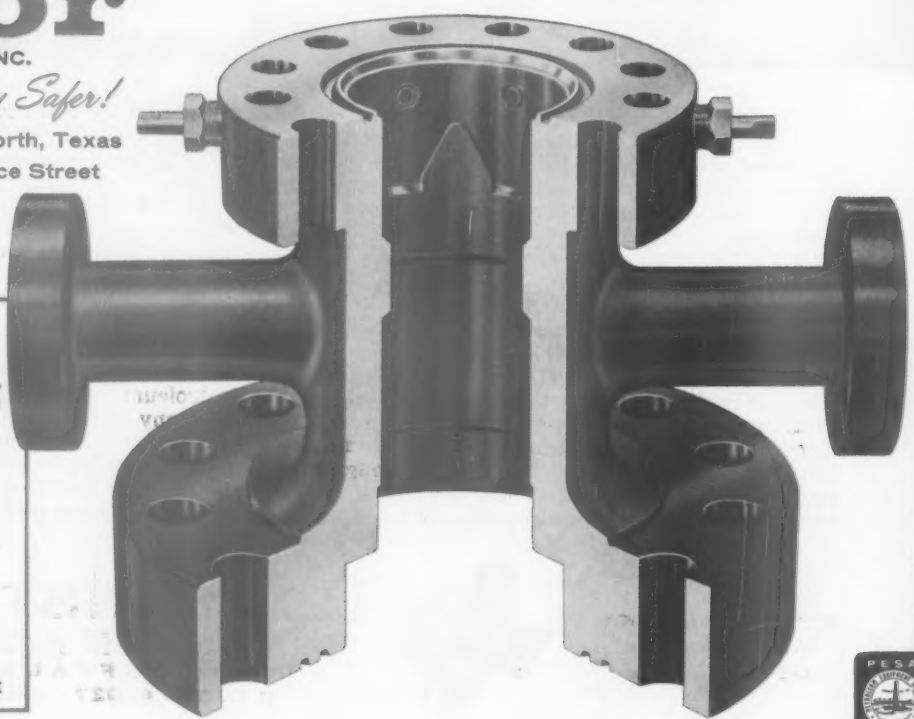
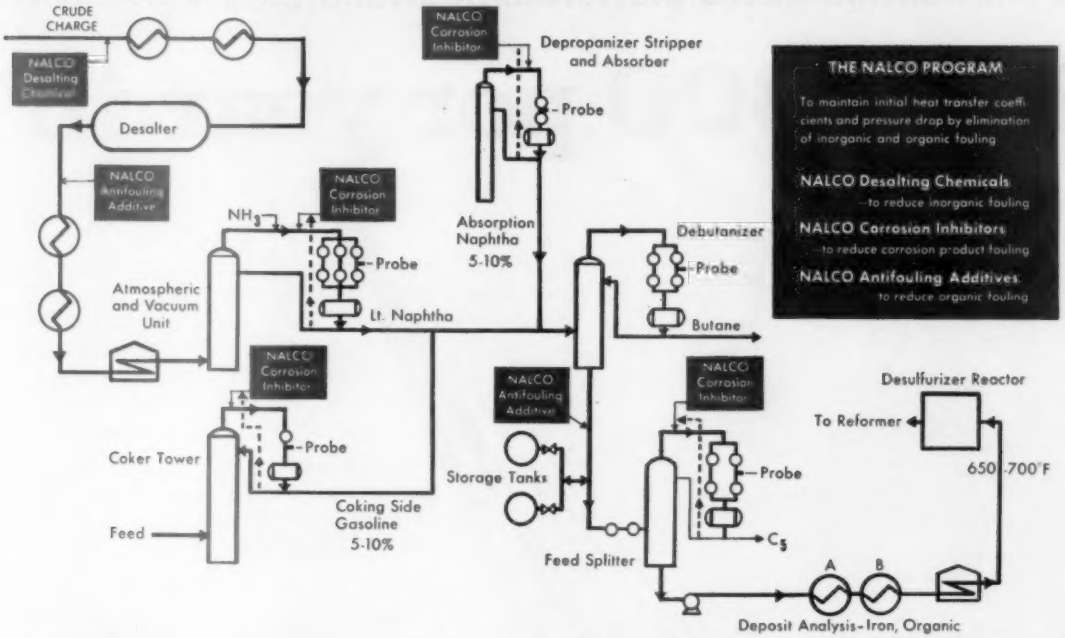


RECTOR DUAL CHRISTMAS TREE

EXPORT REPRESENTATIVES: CONTINENTAL-EMSCO CO., MID-CONTINENT SUPPLY CO., OILWELL DIVISION OF UNITED STATES STEEL CORPORATION

NALCO ANTIFOULING ADDITIVES

ESSENTIAL TO ANY COMPLETE DEPOSIT CONTROL PROGRAM



Fouling deposits in refinery process units have long been a costly problem to refiners. Increased maintenance costs, increased fuel costs, reduced throughput, and more frequent shutdown, all take away from profits. These troublesome deposits, however, can be reduced or eliminated with a carefully planned program.

Such a program, to be totally effective, must be a three-way attack on deposit formation. Desalting chemicals, corrosion inhibitors and antifouling additives individually may reduce deposit formation to a degree. To reduce fouling substantially, however, a combination of all three is essential. Each part of the program performs a separate and necessary function:

Desalting chemicals—remove inorganic salts from the crude, thus eliminating a major source of the inorganic components in deposits.

Corrosion inhibitors—prevent the formation of corrosion products, another major source of inorganic deposits.

Antifouling additives—inhibit formation of long-chain polymers which are the organic component of deposits, and disperse existing particles.

ORGANIC FOULING— THE MAJOR CAUSE OF DEPOSIT FORMATION

Long-chain, high-molecular weight polymers are the real villains in fouling deposit formation. They not only form deposits themselves, but also serve as a binder for inorganic salts and corrosion products to form dense, insoluble masses. Inhibiting the formation of these polymers and dispersing existing polymers are the key factors in deposit control. Nalco antifouling additives perform these functions!

THE NATURE OF ORGANIC FOULING AND ITS CONTROL

Fouling is the result of oxidation reactions involving unsaturated compounds and nitrogen and sulfur compounds usually present in the stream. These reactions form high molecular weight polymers which agglomerate and become insoluble in the refinery stream. Nalco antifouling additives inhibit these reactions, thus reduce polymer formation.

Nalco antifouling additives are more than stabilizers. They are also dispersants, which prevent agglomeration of already formed polymers so that they remain soluble in the refinery stream.

FOULING PROBLEMS? CALL NALCO

Is fouling eating into *your* company's profits? Call Nalco! Your Nalco representative has at his disposal not only effective antifouling, desalting, and corrosion inhibiting chemicals, but also the knowledge and experience it takes to help solve your problems. In addition, the facilities and technical staff of Nalco's petroleum chemical laboratories back him up. With these tools he can help you improve *your* profit picture by reducing downtime and improving unit efficiency. Write for Nalco files G-3, "Refinery Corrosion Control," G3a, "Refinery Fouling Control," and G6, "Desalting and Emulsion Breaking." Then call your Nalco representative to help you start the Nalco Program.

NALCO CHEMICAL COMPANY

6242 West 66th Place • Chicago 38, Illinois

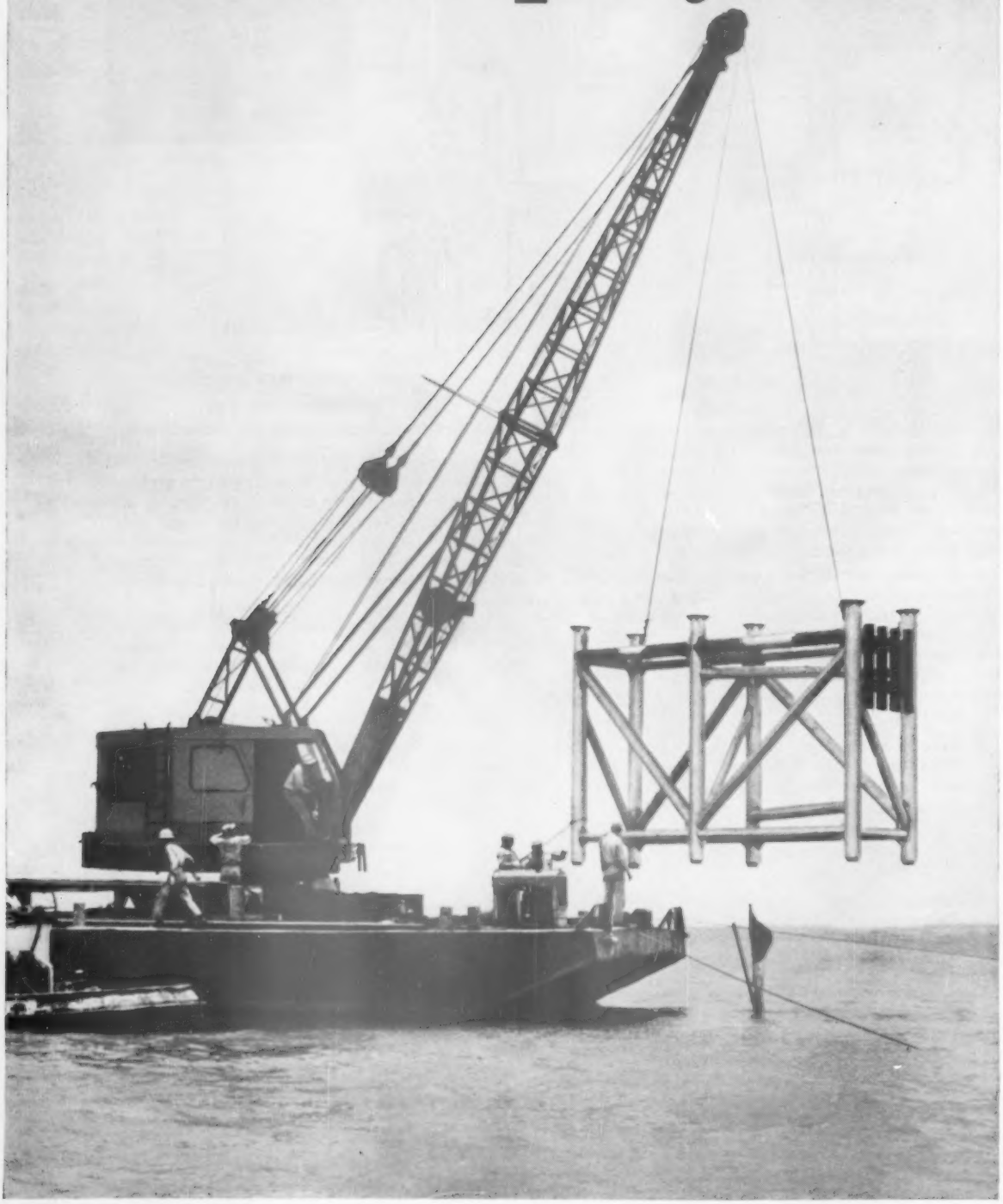
Subsidiaries in England, Italy, Mexico, Spain, Venezuela and West Germany
In Canada: Alchem Limited, Burlington, Ontario

Nalco® ... **Serving Industry through Practical Applied Science**

Nalco CHEMICALS
Nalco SERVICES

Aluminum well guard platforms in offshore duty

Save $800 per year in



upkeep, cost 10% less

A major oil producer recently installed the first offshore aluminum well guard off the southern tip of Padre Island, Texas. These guards are used in shallow offshore production to protect the well head. In addition to providing excellent corrosion-protection, the aluminum well guard platforms offer substantial cost reductions:

The aluminum platform actually costs 10% less initially than a steel one. Reason—for corrosion protection, steel platforms require a taped coating that averages about $1200 per structure.

Steel platforms require quarterly maintenance inspection—costing $400 per year—not necessary with aluminum.

Steel platforms require new coatings—approximately every three years. Aluminum platforms will never need protective maintenance—estimated yearly savings: $400.

Total yearly savings in maintenance—$800.

In addition to these important savings, aluminum provides other advantages. It is lightweight and easy to fabricate. This means that the well guard unit could be prefabricated on shore, and easily transported and installed. Aluminum's non-sparking property is another advantage.

Reynolds engineers worked very closely with Brown & Root, Inc. in the design and fabrication of this unit. Standard 10″ diameter schedule 10 aluminum pipe was used for the legs, and 6″ diameter schedule 40, for the bracing members. Aluminum grating serves as the platform deck.

Actual installation involves placing of the aluminum well guard unit over the completed well and then driving steel piles through the tubular aluminum legs. Concrete grouting is poured between the steel and aluminum legs to prevent galvanic corrosion.

Workmen guiding steel pipe through aluminum leg that will protect and prolong the life of the steel. Standard 10″ schedule 10 aluminum pipe was used for the legs. Cement grouting separates the aluminum pipe and the steel pipe.

Initial material cost doesn't fully determine final cost. Aluminum's light weight, ease of fabrication, and corrosion resistance often mean lower final costs. For information on how aluminum can help you cut costs, contact the leader in developing aluminum applications for the oil industry—Reynolds. Call the Reynolds office nearest you or write Reynolds Metals Company, P.O. Box 2346-CR, Richmond 18, Virginia.

REYNOLDS ALUMINUM

Watch Reynolds TV show "Harrigan & Son", Fridays—ABC-TV

Memo to Management:

ONE BILL...ONE RESPONSIBILITY
MEANS A BIG SAVINGS TO US...

Whether it's power for a pipeline, refinery or pumping, **many oil companies prefer** to purchase dependable **utility electric power** and get all power bills on one **convenient** monthly invoice. Utility electric power works 24 hours a day or operates on any fractional time schedule . . . in any case you pay only for the power used and eliminate many worries. For details contact your nearest Utility Electric Power Company.

PETROLEUM POWER ELECTRIC ASSOCIATION

BOX 35006, DALLAS 35, TEXAS

A list of P.E.P.A. members will be furnished on request.

Better Production Tools Through Research

OTIS Equipment NEWS

Volume III, Number 3 **Otis Engineering Corporation • Dallas** *Production Equipment and Services*

Now...An Otis Flow Line Safety Valve And Pilot For Only $295.00

Proven Otis Safety Valve Design Costs Less Than Many "Substitute" Safety Devices

DALLAS—An all new flow line safety valve employing the time-proven Otis Safety Valve design is now available for installation on wells requiring shut-in protection in the event of flow line breakage. The new valve, designated the Type K Otis Flow Line Safety Valve, may be purchased in the popular 2-inch, 3,000 p.s.i. screw-end size complete with a new Type BE Otis Low Limit Pilot for $295. The Type K Valve is also available with flange-end connections at slightly higher cost. The valve and pilot are designed to automatically shut in a well when flow line pressure drops below the pre-set limit of the pilot. The pressure drop may be due to a break in the flow line itself or the malfunction of auxiliary equipment downstream of the valve. The new Type K Valve and BE Pilot combination offers oil and gas producers effective Otis Safety Valve protection at a new low price — a price which in many cases is lower than that of substitute safety devices such as diaphragm - operated motor valves, etc.

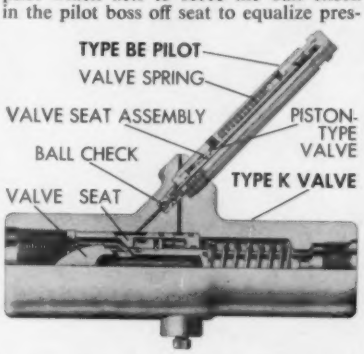
PRICES — TYPE K VALVE AND BE PILOT COMBINATION

Size — Type End	Working Pressure Rating (p.s.i.)	Price
2" — Screw	3,000	$295.00
2" — Screw	5,000	335.00
2" — Flange	3,000	345.00
2" — Flange	5,000	385.00

Note: Be sure to specify pressure range for pilot.

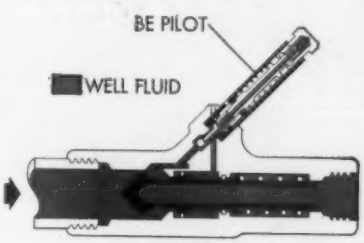
Valve Operating Principles

The Type K Otis Flow Line Safety Valve is a pilot-controlled pressure-operated safety valve designed to automatically shut in a well in the event of abnormal changes in pressure on the flow line or when control pressure from an external source rises above or falls below that for which the pilot is set. On installations where pressure from within the flow line is to serve as the pilot control medium (see schematic drawings), flow line pressure is equalized across the valve and the pilot to permit a spring in the safety valve to hold the valve piston off seat. When pressure within the flow line falls below the set pressure of the pilot, the pilot is designed to exhaust the pressure from behind the valve piston. This action serves to create a differential across the valve and allow flow to close the valve instantaneously. The valve is designed to be reopened by screwing in the nut on the pilot which acts to force the ball check in the pilot boss off seat to equalize pressure across the valve. When installed with the Type BE pilot, the valve serves to provide low-pressure protection. If both high and low pressure protection is desired, the Type E Otis Pilot is recommended. For remote protection, the Type N & P Otis Pilot combination is available.

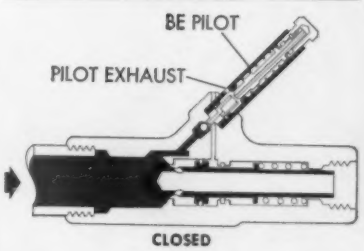


Pilot Operating Principles

The Type BE Low Limit Pilot is a spring-loaded, pressure-actuated control pilot designed to actuate the Type K Otis Flow Line Safety Valve in the event of a drop in flow line pressure below the pre-set limit of the pilot. The pilot consists of a body, a piston-type valve and valve seat, and a valve spring. When installed on a Type K Valve, a port in the safety valve body, the pilot seat assembly, and the pilot valve serves to admit flow line pressure to the pilot. This pressure acts to hold the pilot valve on seat against the force of the valve spring. In the event of a pressure drop across the valve and pilot, the spring within the pilot is designed to force the pilot valve off seat, permitting the pilot seat assembly to move up so that the ball check in the safety valve boss can seat. This action serves to exhaust pressure within the valve, create a pressure differential across the valve and permit the valve to close.



OPENED



CLOSED

Valve and Pilot Design Advantages

Both the Type K Otis Flow Line Safety Valve and the Type BE Otis Low Limit Pilot are of the simplest design and construction to provide reliable and positive operation. The flow path through the Type K Otis Flow Line Safety Valve has been engineered to permit high flow volumes with a minimum pressure drop. The valve was also designed with no small ports or natural body traps to avoid areas in which hydrates and/or paraffin might accumulate to foul the valve's operation. Both the valve and pilot are so designed as to permit each to be used with other Otis Safety Equipment.

Otis Surface Safety Valves and Pilots have long been recognized as the very finest. Otis Safety Valve Specialists have earned the same enviable reputation. Whatever your well safety valve requirements, Otis can be of help. For more information on Otis Safety Equipment, or for help with a specific safety valve installation problem, call the Otis office nearest you, or write Otis, Dept. 3-E, P.O. Box 35206, Dallas 35, Texas. You'll find experienced Otis Safety Valve Specialists ready to help you — anxious to serve you . . . with the widest variety of field-proven safety valves and pilots available today.

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Jal-Con-Weld "50"
High Strength
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Because Jal-Con-Weld "50" offers a 50,000 pound psi minimum yield strength, yet is priced well below conventional high strength tubing.

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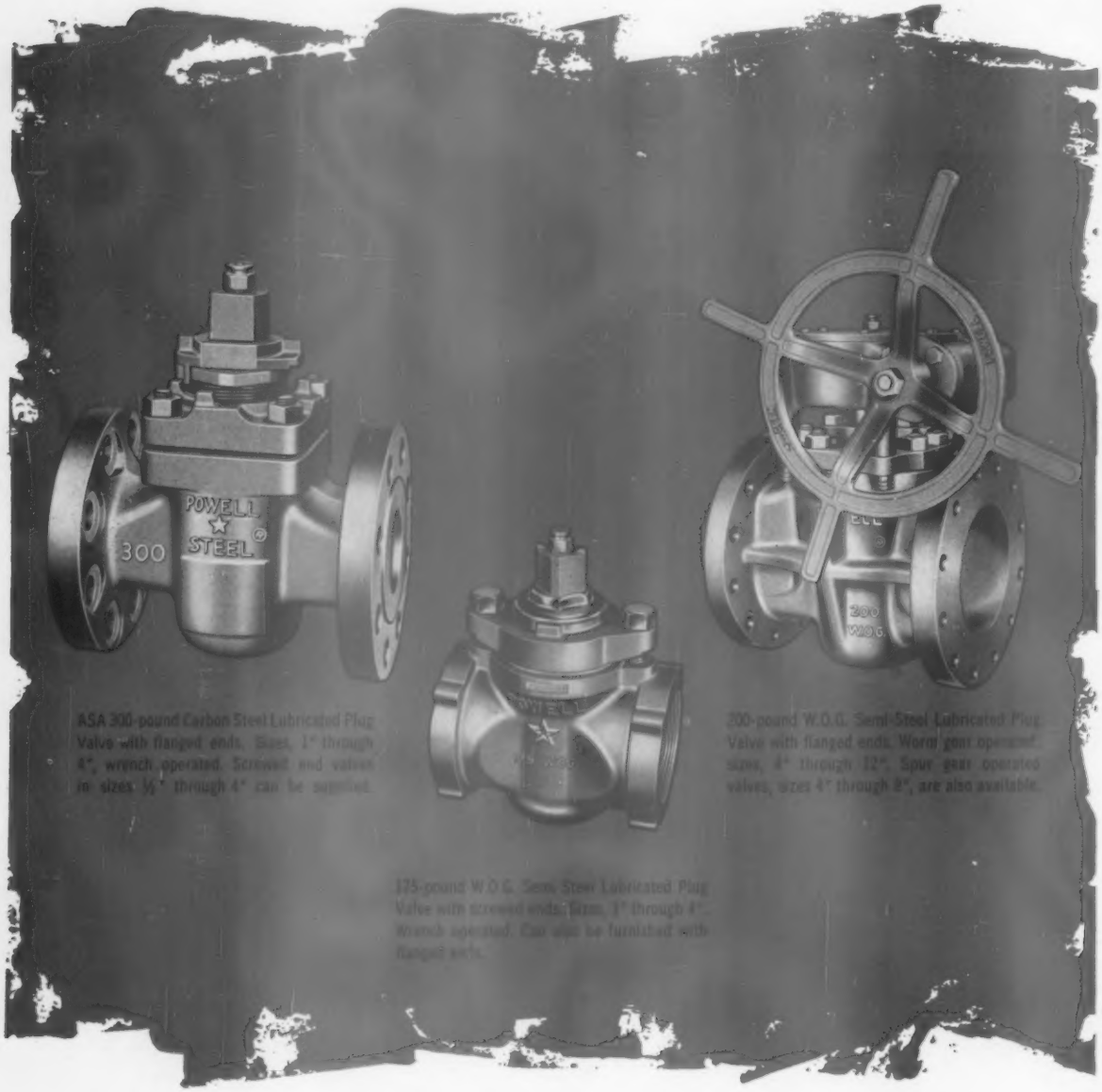
It is a matter of record, in refineries everywhere, that Powell valve performance really is paying off.

And equally important is the fact that whether you need valves to control the flow of water, oil, gas, air, steam or corrosive fluids—available in steel, bronze, iron or alloys—Powell has them.

You'll find every Powell valve is designed by engineers long experienced with the industry's valve requirements . . . and built by craftsmen who take pride making a valve you can count on.

So, by filling your flow control needs quickly, with truly reliable valves from one source of supply, you too, can be sure of valve performance that will pay off. For further information or assistance with special problems, contact your nearby Powell valve distributor or write The Wm. Powell Company, Cincinnati 22, Ohio.



ASA 300-pound Carbon Steel Lubricated Plug Valve with flanged ends. Sizes 1" through 4", wrench operated. Screwed end valves in sizes ½" through 4" can be supplied.

200-pound W.O.G. Semi-Steel Lubricated Plug Valve with flanged ends. Worm gear operated sizes, 4" through 12". Spur gear operated valves, sizes 4" through 8", are also available.

175-pound W.O.G. Semi-Steel Lubricated Plug Valve with screwed ends. Sizes 1" through 4". Wrench operated. Can also be furnished with flanged ends.

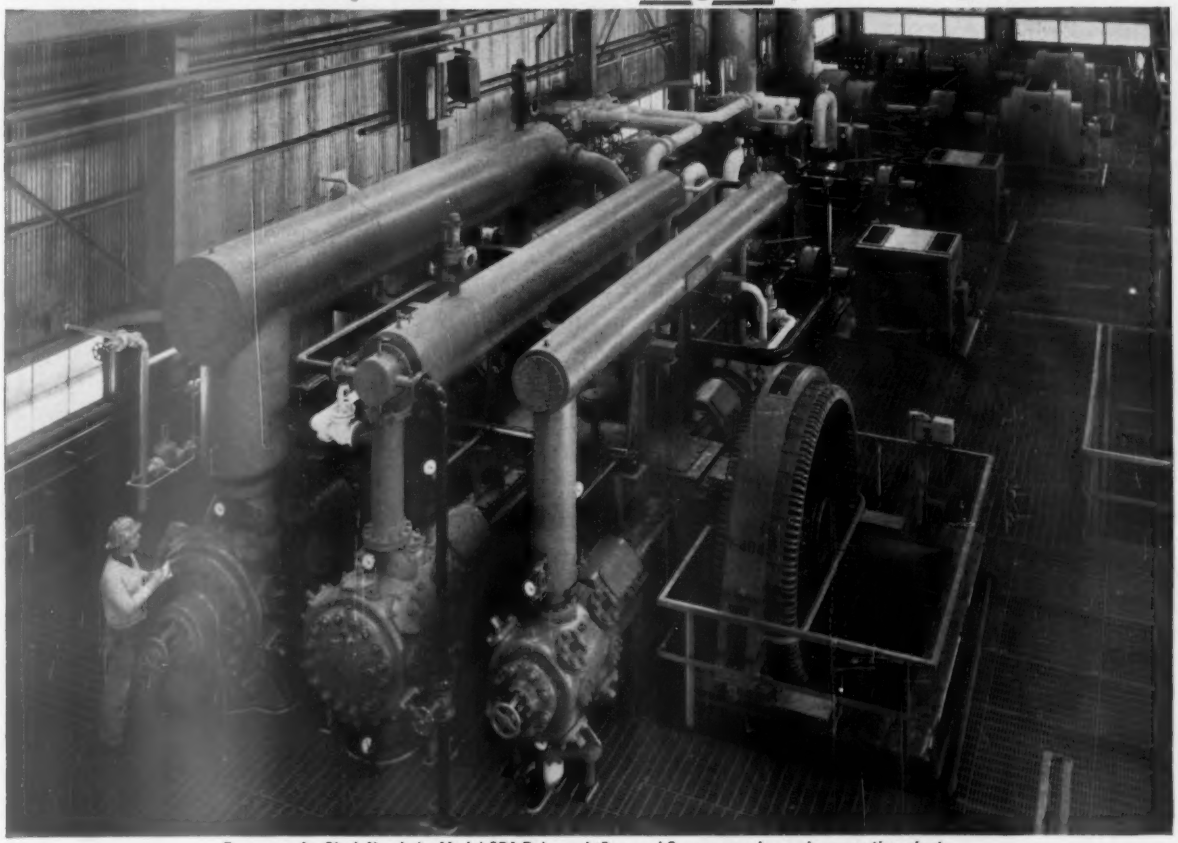
115th year of manufacturing industrial valves for the free world

POWELL PETROLEUM **VALVES**

THE WM. POWELL COMPANY CINCINNATI 22, OHIO

OVER 3000 HOURS ON STREAM...

Clark non-lube compressor still has original piston rings and trim!



Foreground—Clark Non-Lube Model CRA Balanced/Opposed Compressor in an air separation plant.

Uncontaminated nitrogen gas for a liquid oxygen refrigeration cycle is kept "bone dry" in this Clark Non-Lube Model CRA-6 Balanced/Opposed Compressor. Installed in Wheeling Steel's new air separation plant at Steubenville, Ohio, the 1250 bhp unit has shown remarkable dependability since startup. After going through initial blowdown, initial start-up, and 3000 hours on stream, the machine is still operating with its first set of piston rings and trim.

There are several reasons for this on-the-job endurance:

- The compressor operates at a conservative speed to hold down friction and temperature levels.
- Staging is extremely conservative—five stages are used to compress nitrogen from atmosphere to 565 psi.
- Non-lubricated, non-metallic piston rings, packing rings and riders are used to prevent hydrocarbon contamination of the gas stream.
- Compressor piston rods and cylinder liners are micro-polished to minimize wear and heat of friction.
- The non-lube cylinders are connected to the crankcase by extra long distance pieces. Lubricated areas of the piston rod do not enter the non-lubricated cylinder.
- Clark Balanced/Opposed design provides smooth, vibration-free performance. The foundation need only be large enough to support the weight of the compressor.
- Unit was furnished as a complete package with overhung motor, all intercoolers and interconnecting piping mounted on the compressor frame.

The new tonnage oxygen plant at Wheeling Steel is just one of many modern processes where Clark Balanced/Opposed Compressors have been specified because they can do the job best.

Air or gas, lube or non-lube, 75 to 8000 bhp, vacuum to 50,000 psi . . . Clark has the compressor—and the experience—to help you make the most profitable choice. The next time you plan a new facility, take advantage of them both. Contact your nearest Clark representative *first!*

CLARK BROS. CO. OLEAN, N. Y.

ROOTS CONNERSVILLE — *Blowers, Compressors, Gas Pumps, Rootsmeters, Vacuum Blowers*

Working together in allied industries . . .

PODBIELNIAK — *Centrifugal Contactors, Distillation Apparatus, Instrumentation*

CLARK — DRESSER INDUSTRIES INC. — OIL • GAS • CHEMICAL ELECTRONIC • INDUSTRIAL

FOR RELIABLE, UNFAILING ELECTRIC OPERATION... It's the HYDRAMOTOR® valve, designed by General Controls for lines up to 12" diameter and offering the advantages of single-unit, sealed-in-oil hydraulic ram power that's controlled by simple 2-wire circuitry.

Electro-hydraulic power operation eliminates complicated linkages and gearing, as well as need for outside air or gas supply—and it's fail-safe because the valve returns to safe position by spring force if power is interrupted. Ideal for use in cold weather, the Hydramotor is available in a low temperature unit designed for ambient conditions to –40°F.

BE QUALITY SURE...ALWAYS SPECIFY GENERAL CONTROLS

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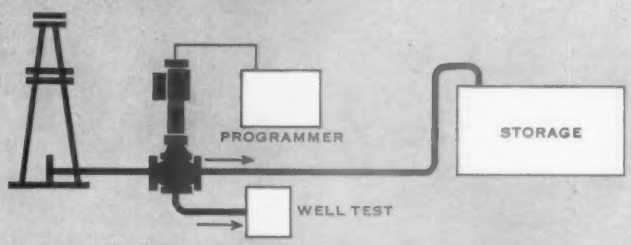
Nine Plants — 44 Factory Branch Offices Serving
The United States, Canada and Western Europe

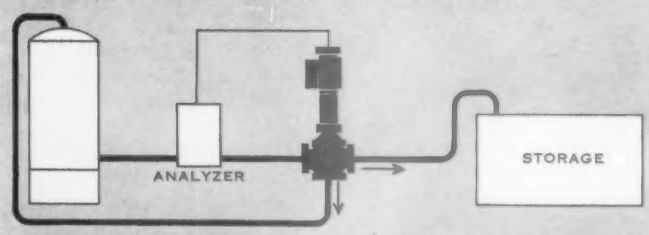
HERE'S THE VALVE THAT SOLVES YOUR OIL FIELD CONTROL PROBLEMS...

THREE BASIC TYPES of hermetically sealed Hydramotors are available in dust proof, drip proof, explosion proof and weather proof models: **Standard Hydramotors** provide open, closed, or in-between positioning. **Three-way 2-position units** provide for diverting flow from a common source to either of two outlets. **Three-way 3-position Hydramotors** carry flow from well to production, to test sampling or secondary tank, or to shut off. Hydramotor valve actuators are manufactured in a range of 180 to 6000 pounds of stem thrust and in a stroke range of ⅝" to 4½". Valve bodies of cast iron, cast bronze, cast carbon steel, stainless steel and other alloys are available in 150, 300, 600, 1500, 3000 and 6000 lb. ASA ratings.

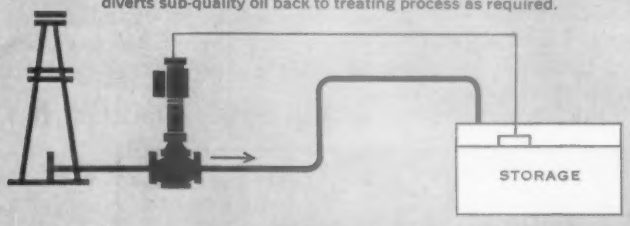
Write today for complete information. Ask for Bulletin 608.338.



WELL TESTING, 3-way 2-position Hydramotor valve samples rate and quality of flow on command or through programming equipment. The 3-way 3-position Hydramotor not only diverts flow but also provides full shut off for well shut in.



AUTOMATIC CUSTODY TRANSFER, 3-way 2-position Hydramotor diverts sub-quality oil back to treating process as required.



TANK SWITCHING, a standard Hydramotor controls level in storage tanks.

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They Say—

One author only

Dear Sir:

Please refer to the article, "To Fish or Not to Fish; That Is the Question," which appeared in the July 24 issue of The Oil and Gas Journal, Page 80. The authors are given as Robert W. Ruhe, Jr., and myself.

However, the manuscript was prepared while I was moving from the United States to Canada, and then to France. As a result, I was not able to help with the writing and editing of the article. Full credit should, therefore, be given to Mr. Ruhe.

George W. Perry
Mobilrex
Paris

High wells in the Andes

Dear Sir:

You say on Page 125 of the July 17 issue that a Pan Am wildcat in Colorado, elevation 11,200 ft., will be the highest well ever drilled. I am reasonably certain that quite a number of shallow wells were drilled with cable tools circa 1915-20 in the Pirin field of Peru at elevations in the 12,000 or 13,000-ft. range. I believe the last well in the area was drilled by the Peruvian Government about 1939, to perhaps 2,200 ft. total depth.

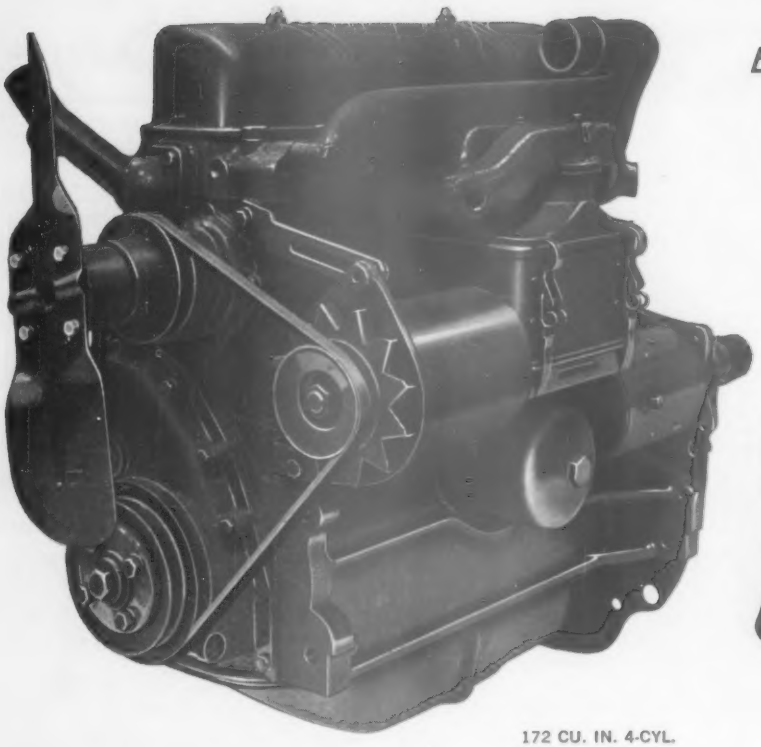
Dale Tapp
Seguin, Tex.

Old "record" really wasn't

Dear Sir:

Your most informative and interesting article on Page 125 of the July 17 issue ("Pan Am High on Its Mountain Wildcat") stated that Pan Am's Red Table Mountain Unit wildcat would be drilled at a higher elevation (11,200 ft.) than any well drilled to date, exceeding the current record of 9,725 ft. held by a well in Joe's Valley field, Sanpete County, Utah.

Please be advised that Apache Corp.'s 1 Mickelson-Gov't., 15-11s-94w, Mesa County, Colorado, a producing gas well from the Mesaverde formation, was drilled at an elevation of 10,015 ft. Apache's 1



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172 CU. IN. 4-CYL.

330 CU. IN. 6-CYL. POWER UNIT

DEPENDABLE FORD DIESELS... truly modern... truly economical!

All three highly efficient and economical Ford Diesels —the 172-, 220- and 330-cubic-inch model—offer such advanced features as:

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SUSTAINED HIGH TORQUE . . . necessary for "hanging onto" heavy loads without stalling.

SUPERIOR STARTING . . . all Ford Diesels offer a 12-volt electrical system for faster starting.

GREATER ECONOMY . . . such features as Free-Turn overhead valves and replaceable cylinder sleeves reduce maintenance and downtime, increase engine life and provide easier servicing.

PARTS AND SERVICE . . . high quality, low-priced Ford parts are as near as your Ford Dealer, for service *when* you need it!

For peak performance *all* the time, and the *minimum* in downtime, call or write us today. We'll be happy to help you select the right power for your job!

ENGINE SERIES		172 FOUR DIESEL	220 FOUR DIESEL	330 SIX DIESEL
Basic Model		DD	X	Y
Type		4-Cyl. O.H. Valve	4-Cyl. Diesel	6-Cyl. Diesel
Bore and Stroke—Inches		3.9 x 3.6	3.94 x 4.52	3.94 x 4.52
Displacement—Cubic Inches		172	220	330
Brake Horsepower	Dynamometer	59 @ 2400	62 @ 2400	99 @ 2400
	80% Dyn. BHP	47 @ 2400	49 @ 2400	79 @ 2400
Torque	Dynamometer	140# @ 1200	151# @ 1600	236# @ 1600
	80% Dyn. BHP	112# @ 1200	121# @ 1600	189# @ 1600
Compression Ratio		16.8 to 1	16 to 1	16 to 1

YOUR JOB IS WELL-POWERED WHEN IT'S FORD POWERED!

Ford

INDUSTRIAL ENGINES AND POWER UNITS

INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 135, DEARBORN, MICH.

West of Rockies write to:
→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.
→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.

U. S. Gov't.-Smith well was drilled at an elevation of 9,900 ft., and Apache is currently drilling a third well in the area, its 2 U. S.-Mickelson, which will be at an elevation of 10,122 ft.

Apache's Smith well was drilled in the middle of winter when the problems of operating in subfreezing temperatures were added to the problems of drilling in a rarefied atmosphere. I sincerely hope that Pan Am does not have the problems which we have encountered in drilling our wells.

George J. McLernon, Jr.
Vice President and Manager of Operations
Apache Corp.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR OF EVENTS

AUGUST

11 Southern Gas Association, pipeline chief engineers' roundtable conference and gas measurement superintendents' roundtable, Dinkler-Tutwiler Hotel, Birmingham.

11 Southern Gas Association, accident prevention roundtable conference, Hotel Heidelburg, Jackson, Miss.

20-22 North Dakota Oil and Gas Association, ninth annual meeting, Plainsman Hotel, Williston, N. D.

20-24 Asphalt Institute, international conference on structural design of asphalt pavements, University of Michigan, Ann Harbor.

28-30 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

28-Sept. 1 American Society of Mechanical Engineers, international heat transfer conference, Boulder, Co.

SEPTEMBER

5-8 American Chemical Society, Chicago section, eleventh national chemical exposition, International Amphitheatre, Chicago.

7-8 Rocky Mountain Association of Geologists, field conference, Salida, Monarch, Ouray, Silverton, and Durango, Colo., areas.

7-9 Magic Plains Oil Exposition, Borger, Tex.

7-9 Alberta Society of Petroleum Geologists and Geological Association of Canada, convention and field trip, Canadian sedimentary basins, Calgary.

11-15 Instrument Society of America, fall instrument-automation conference and exhibit and sixteenth annual meeting, Biltmore Hotel and Memorial Sports Arena, Los Angeles.

12-13 American Gas Association, Southern Gas Association, annual accident prevention conference Statler Hilton Hotel, Dallas.

13-15 Pacific Coast Gas Association, convention and annual meeting, Coronado Hotel, Coronado, Calif.

13-15 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

13-15 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.

13-15 National Northern Development Conference, "Canada's New Role in Resource Development," MacDonald Hotel, Edmonton.

14 Natural Gasoline Association of America, Rocky Mountain regional meeting, Northern Hotel, Billings, Mont.

15-16 Kansas Geological Society, annual field conference, Mark Twain Hotel, Hannibal, Mo.

17-20 American Institute of Electrical Engineers, annual electrical conference of the petroleum industry, Jung Hotel, New Orleans.

18-19 Independent Natural Gas Association of America, annual meeting, Shamrock Hilton Hotel, Houston.

18-20 Standards Engineers Society, tenth annual meeting Hotel Sherman, Chicago.

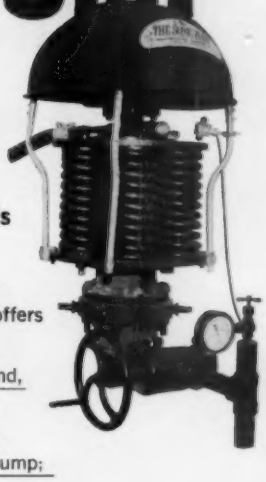
20-21 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

20-21 American Institute of Electrical Engineers, Institute of Radio Engineers, Instrument Society of America, industrial electronics symposium, Bradford Hotel, Boston.

20-22 National Association of Corrosion Engineers, Permian Basin section, annual West Texas corrosion tour,

Progress Report...

SONIC PUMP



Two years ago Johnston Testers began a comprehensive research and development program for the Sonic Pump. Field tests defined the areas of application and were so successful that the pump is now considered a proven product.

The Sonic Pump is presently available for tubing depth ranges of 400-4000 feet, and offers these major advantages:

√ demonstrated ability to pump paraffin, sand, mud, gyp and other agents detrimental to conventional pumping equipment;
√ requires no sucker rods or subsurface pump;
√ simplicity of installation;
√ minimum lubrication and maintenance;
√ flexibility of operation.

JOHNSTON TESTERS

P. O. Box 98, Houston 1, Texas

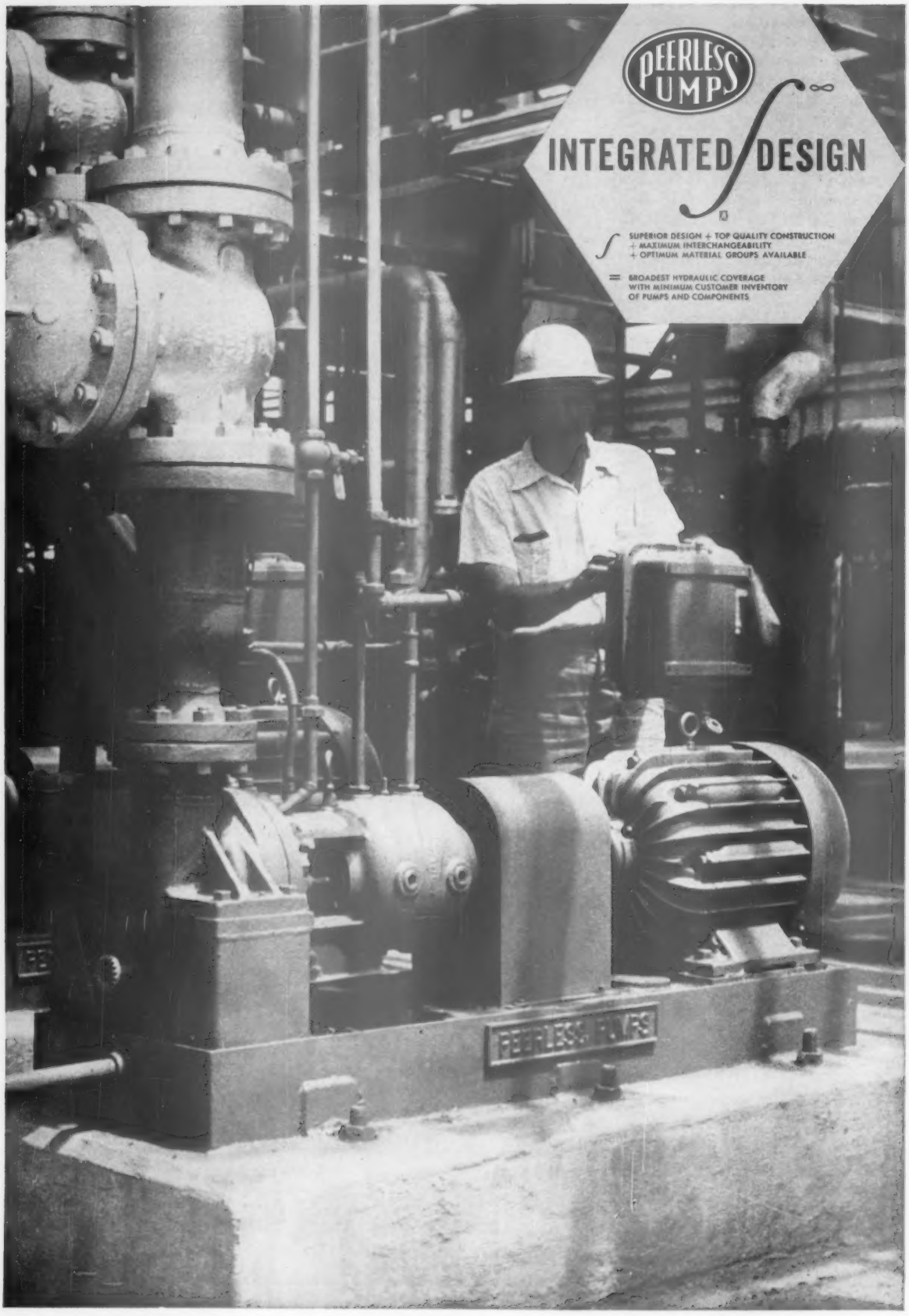
321-50th Avenue S.E.-Calgary, Alberta

I would like more information regarding application of the Sonic Pump.

Name_____ Title_____

Company_____

Address_____


PEERLESS PUMPS
INTEGRATED ∫ DESIGN
∫ SUPERIOR DESIGN + TOP QUALITY CONSTRUCTION
+ MAXIMUM INTERCHANGEABILITY
+ OPTIMUM MATERIAL GROUPS AVAILABLE
= BROADEST HYDRAULIC COVERAGE
WITH MINIMUM CUSTOMER INVENTORY
OF PUMPS AND COMPONENTS
PEERLESS PUMPS

MEANS YOU CAN QUICKLY MODIFY THE SAME PUMP FOR DIFFERENT CAPACITIES

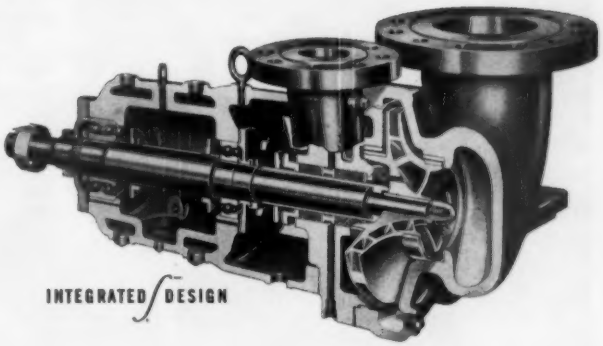
Component interchangeability permits desired pump to be assembled from standard components in a minimum of time.

Recently a large process plant in the gulf coast decided to increase its output. In the process of redesign it became necessary for a particular group of pumps to handle double their capacity. Because these pumps were integrated Peerless Type PR units, the solution was simple. By merely changing the impeller and volute, these pumps were ready to handle the higher pumping capacities required.

Unusual example? Not at all. Rather it is typical of the versatility designed and built into this line of high pressure, high temperature Peerless process pumps. Peerless PR and PRS pumps offer many other advantages. Virtually all liquids in refining processes can be pumped by these units. Widest capacity and head conditions are easily met. And the maximum interchangeability factor materially reduces inventory costs. Get the best for process pump needs, specify and buy Peerless. Send for informative Bulletin No. B-1605 now.

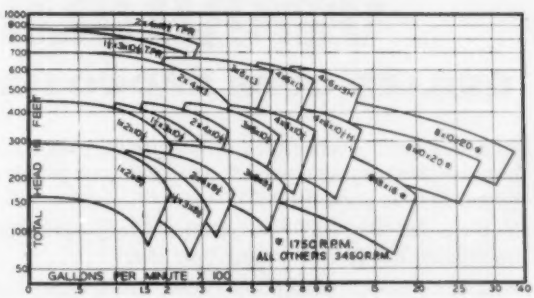
INTEGRATED DESIGN FOR GREATER EFFICIENCY AND ECONOMY

PEERLESS PUMPS



PEERLESS PR AND PRS PUMPS ARE AVAILABLE IN 1" TO 8" SIZES INCLUSIVE

Designed to handle hot oil, hot water, hydrocarbons and many chemicals used in the process industries. Capacities to 3000 gpm. Heads to 700 feet. Type PR (packing gland construction) handles temperatures to 850° F. Type PRS (mechanical seal) handles temperatures to 250° F. Liquid ends available in any machineable metal. Electric drive is standard: other drives as required.



Putting Ideas to Work

fmc CORPORATION

Peerless Pump

HYDRODYNAMICS DIVISION

Offices:

New York; Detroit; Cleveland; Chicago; Indianapolis; St. Louis; San Francisco; Atlanta; Plainview; Lubbock; Phoenix; Albuquerque; Los Angeles; Fresno.

Distributors in principal cities.

Consult your telephone directory.

Peerless Pump, Hydrodynamics Division, Food Machinery and Chemical Corporation
301 West Avenue 26, Los Angeles 31, California

Please send me Bulletin B-1605 ☐ Have field engineer contact me ☐

Name_____

Address_____

City_____

State_____

HOLDS LOAD "RIGHT THERE"

SMOOTHER THAN STEAM

DRILLED OVER 22,000 HOURS AND STILL GOING STRONG

Run a torque converter on a drilling rig for over 22,000 hours without laying a wrench on it and your profits are bound to look good. Right?

You can bet they will – for you'll not only save money on repairs, but on lost drilling time too.

And that's exactly what Crow Greyhound Drilling Company of Shreveport, La., is doing by using TORQMATIC Converters on three of its drilling rigs. The converters on one rig have racked up more than 22,000 hours of trouble-free service. In all that time, *the only thing Crow Greyhound Drilling Co. did to the converters was normal preventative maintenance.*

But it's not just TORQMATIC's trouble-free performance that's saving money for Crow Greyhound Drilling Co. They're also drilling faster, making faster round trips, spending less on rig maintenance because of the "smoother than steam" power transmission. Inch-by-inch control saves time on fishing jobs–and drill strings last longer with TORQMATIC absorbing the shocks.

You can make more–save more–with TORQMATIC DRIVES working for you on your drilling, fracturing, or servicing jobs. They're available from most leading oil field equipment manufacturers. See your dealer for details, or write Allison Division, General Motors, Indianapolis 6, Indiana. In Canada: General Motors Diesel Limited, London, Ontario.

Allison

TORQMATIC® DRIVES

THE MODERN DRIVE FOR MODERN EQUIPMENT

Lincoln Hotel, Odessa, Tex.

24-27 American Institute of Chemical Engineers, national meeting, Lake Placid Club, Lake Placid, N. Y.

24-27 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Muehlebach Hotel, Kansas City.

25-27 Texas Mid-Continent Oil and Gas Association, annual meeting, Texas Hotel, Fort Worth.

25-28 American Welding Society, fall meeting, Adolphus Hotel, Dallas.

OCTOBER

1-4 American Gas Association, annual convention, Dallas.

3-4 University of Kansas, ninth annual gas measurement institute, National Guard Armory, Liberal, Kans.

4-6 American Association of Oilwell Drilling Contractors, annual meeting, Rice Hotel, Houston.

4-6 American Society of Mechanical Engineers, process-industries conference, Shamrock-Hilton Hotel, Houston.

8-11 Society of Petroleum Engineers of AIME, annual fall meeting, Memorial Auditorium, Dallas.

11-12 Western Petroleum Refiners Association, waste disposal and stream pollution conference, Hotel Lassen, Wichita.

12-13 California Natural Gasoline Association, annual fall meeting, Lafayette Hotel, Long Beach, Calif.

15-17 National Association of Oil Equipment Jobbers, annual convention and trade show, Mayflower Hotel, Washington.

15-18 American Petroleum Credit Association, annual conference, Shamrock-Hilton Hotel, Houston.

17-19 American Society of Mechanical Engineers, American Society of Lubricating Engineers, lubrication conference, Morrison Hotel, Chicago.

18-20 Rocky Mountain Oil and Gas Association, annual conventon, Denver-Hilton Hotel, Denver.

18-21 American Association of Petroleum Geologists, Mid-Continent regional meeting, Amarillo, Tex.

19-22 Louisiana Gulf Coast Oil Exposition, Lafayette, La.

24-25 University of Kansas, Southwest Kansas Center, pipeline institute, Court House, Liberal, Kans.

24-25 Pennsylvania Grade Crude Oil Association and Pennsylvania State University Mineral Industries Experiment Station, technical conference on oil recovery by solvents, Pennsylvania State University campus, University Park.

24-27 National Association of Corrosion Engineers, south-central region conference and exhibition, Shamrock-Hilton Hotel, Houston.

25-26 Western Petroleum Refiners Association, annual question and answer session on refining technology, Rufus Garrett Hotel, El Dorado, Ark.

25-27 Gulf Coast Association of Geological Societies, annual meeting, Granada Hotel, San Antonio, Tex.

27 Natural Gasoline Association of America, southern regional meeting, Carlton Hotel, Tyler, Tex.

29-31 Independent Petroleum Association of America, annual meeting, Shamrock-Hilton Hotel, Houston.

29-Nov. 1 National Lubricating Grease Institute, annual meeting, Rice Hotel, Houston.

NOVEMBER

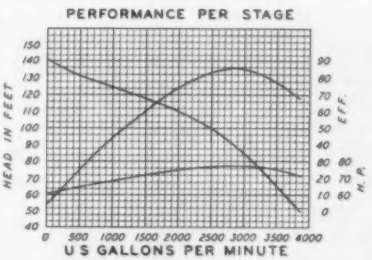
1-3 Southwest Federation of Geological Societies, annual meeting, Hilton

▶▶▶ Why Johnston Verticals work so well in Waterfloods

Versatility and flexibility are the two main reasons why Johnston vertical pumps work so well in waterfloods. For example:

For Raw Water Supply

The vertical turbine was originally developed as a water supply pump so it is right at home in furnishing raw water requirements—regardless of the source. Here are some of its advantages: (1) It works well under both remote control and automatic operation because the bowls are submerged and hence the pump is always primed; (2) A Johnston operates efficiently at variable heads without overloading the driver (from shut-off to full capacity) because of its steep head capacity curve and flat horsepower requirements (see Fig. 1); (3) It works equally well with any power source; (4) Johnstons are especially resistant to corrosion and abrasion because of vitriform enamel-lined bowls and other construction features.



TYPICAL JOHNSTON TURBINE PUMP
AT 1760 R.P.M. N_s 3500

Fig. 1

As a Pipeline Booster

The features that make the pump good for raw water supply also apply to it as a pipeline booster, but it has these further advantages: (1) In-line piping connections permit more straight pipe runs; (2) Impellers can be trimmed or stages added to provide for new pumping conditions without changing the basic construction of the pump; (3) The pump can be pulled without unhooking any piping; (4) Replaceable bearings and wear rings simplify maintenance, while the packing box is readily accessible for easy adjustment.

For Injection Supply

This is where a Johnston really shines, because, above all, Johnstons are *flexible*. (1) Johnstons, for example, will give an almost unlimited range of power-capacity combinations in a system; (2) Pressures can go as high as 2500 psi with capacities ranging upward from 3,430 bbls. per day; (3) In most cases, multi-pump stations are used which, with the variations possible within each unit, make for unparalleled efficiency, as well as real operating economy. (See Fig. 2 for typical installation.)

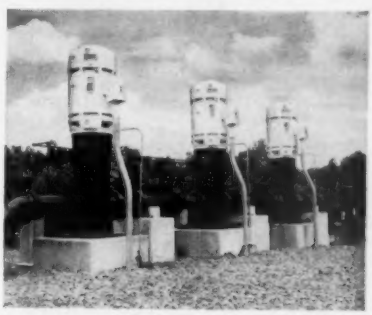


Fig. 2

Johnstons have been field proven by experienced operators in many successful waterfloods and we would be glad to give you data to indicate how they could also work well for you. Just call or write for more complete information or ask for an appointment with one of our trained field men.

JOHNSTON PUMP COMPANY

Main Factory: Pasadena, Calif., 3272 E. Foothill Blvd.; Phone: MU 1-7601
Factory Branches: New York 20, N.Y., 30 Rockefeller Plaza; Phone: PL 7-0431 • **Atlanta 1, Georgia,** 57 Forsyth St., N.W.; Phone: JA 3-7395 • **San Francisco 8, Calif.,** 260 Kearny St., Phone: EX 2-0338 • **Roswell, N.M.,** 2007 S.E. Main; Phone: MA 2-5942 • **Pecos, Texas,** Balmorhea Highway; Phone: HI 5-3022 • **Idaho Falls, Idaho,** South Yellowstone Hwy.; Phone: JA 2-8144

CORBAN low-cost way to combat well corrosion

Corban® polar-type corrosion inhibitor is offered in 14 varieties to meet and combat both sweet and sour oil and gas well corrosion.

Corban is available in three forms: ready-to-use liquid, concentrated liquid, and sticks 18 inches long and 1½ inches in diameter. Some types of Corban are soluble in oil. Other types are soluble or dispersible in fresh water or brine.

Corban may be applied in any conventional manner, or by the Dowell-developed squeeze technique. Many operators depend on Corban for excellent results with low treating costs. Call your Dowell representative for full information.

PRODUCTS FOR THE OIL INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

Hotel, El Paso, Tex.

2-3 Society of Petroleum Engineers of AIME, annual California regional meeting, Hacienda Motel, Bakersfield, Calif.

2-4 Geological Society of America, annual meeting, Cincinnati, Ohio.

5-9 Society of Exploration Geophysicists, international meeting, Denver.

6-8 Chemical Institute of Canada, conference of the chemical engineering division, Royal York Hotel, Toronto.

9-10 Society of Automotive Engineers, national fuels and lubricants meeting, Shamrock-Hilton Hotel, Houston.

13-15 American Petroleum Institute, forty-first annual meeting, Conrad Hilton, Congress and Palmer House hotels, Chicago.

16 Illinois Oil and Gas Association, annual meeting, Mount Vernon, Ill.

17 Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

26-Dec. 1 American Society of Mechanical Engineers, winter annual meeting, Statler-Hilton Hotel, New York City.

DECEMBER

3-6 American Institute of Chemical Engineers, annual meeting, New Yorker Hotel, New York City.

4-6 Interstate Oil Compact Commission, annual meeting, Denver Hilton Hotel, Denver.

5-6 Western Petroleum Refiners Association, computer conference for refiners, Hotel Tulsa, Tulsa.

JANUARY

8-12 Society of Automotive Engineers, annual meeting, Cobo Hall, Detroit.

16-18 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville, Ky.

FEBRUARY

4-7 American Institute of Chemical Engineers, national meeting, Statler Hotel, Los Angeles.

15-17 Southwestern Legal Foundation, annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

18-22 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, New York City.

27-Mar. 2 International Oil and Gas Educational Center, institute on economics of the gas industry, Southwestern Legal Center, Dallas.

28-Mar. 2 American Petroleum Institute, Division of Production, southern district meeting, Rice Hotel, Houston.

MARCH

2 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

18-22 National Association of Corrosion Engineers meeting, Municipal Auditorium, Kansas City, Mo.

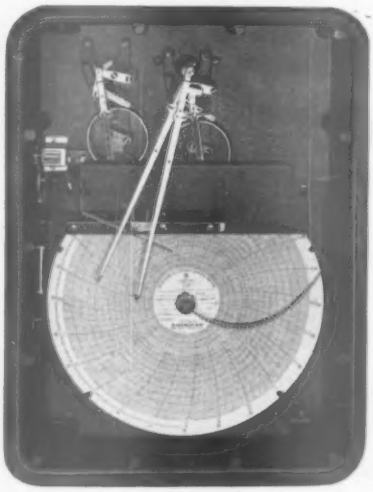
19-22 Kentucky Petroleum Marketers Association, management institute conducted by the University of Louisville, Brown Hotel, Louisville, Ky.

21-23 New England Gas Association, annual meeting, Statler-Hilton Hotel, Boston.

21-23 American Petroleum Institute, Division of Production, southwestern district meeting, Lincoln Hotel, Odessa, Tex.

26-29 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, joint annual meeting, Fairmont Hotel, Civic Auditorium, San Francisco.

INTEGRATING ORIFICE METERS



American® Integrating Orifice Meters provide more accurate measurement by the continuous multiplication of the square root of the measured differential by the square root of the absolute line pressure.

Single, double and duplex-integrating models available in a wide range of manometer types and working pressures. Dustproof, die-cast aluminum cases... Gasclok and electric instrument chart drives. Also supplied with American Telecounter for remote readings.

See Bulletin 401 for details.

AMERICAN METER COMPANY

Sales Offices in Principal Cities

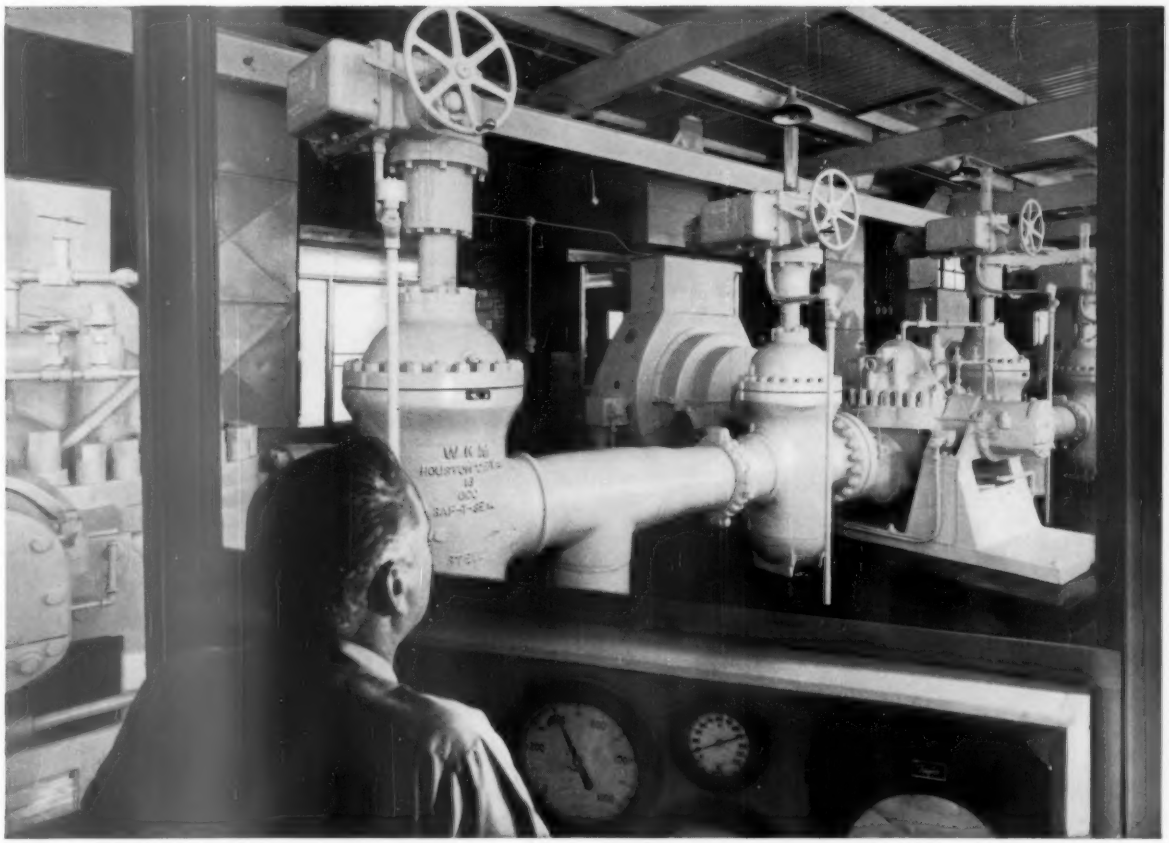
WHEN SO MUCH DEPENDS ON A VALVE...
Specify Saf-T-Seal

Five W-K-M SAF-T-SEAL Gate Valves in this automated crude oil pumping station control a daily flow of 250,000 barrels of crude at 500 psi. These valves are first choice for vital jobs because of their unequalled sealing ability and extremely high reliability factor.

The SAF-T-SEAL is a non-lubricated pressure sealing gate valve—its floating steel seats with Teflon inserts give positive, total contact sealing *both upstream and down, in both open and closed position.* Its basic simplicity provides a degree of reliability greater than any other similar valve. Further, when working parts become worn, new valve performance may be quickly restored by installing new parts *while the valve is on the line.* Other features, such as automatic relief of excessive body pressure, the efficient enclosed packing gland, the effectiveness of the valves in double block and bleed service, are explained in Catalog WS 1061. Write for your copy today. W-K-M Division of ACF Industries, Inc., Box 2117, Houston, Texas.

W-K-M SAF-T-SEAL Gate Valves are available in sizes from 2 inches through 42 inches. Pressure ranges: ASA 150, ASA 300, ASA 600, ASA 900.

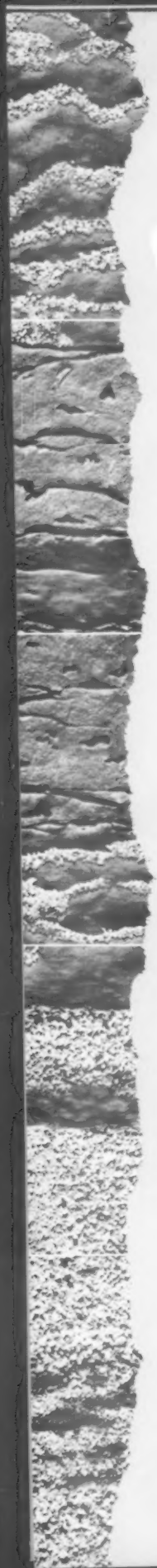
WHEN SO MUCH DEPENDS ON A VALVE... *Specify* W-K-M®



W-K-M
DIVISION

ACF INDUSTRIES

PIPE
FORMATION
CASED HOLE
Amplitude curve of free pipe up the hole
Good pipe bond, good formation bond
Good pipe bond, good formation bond
Poor pipe bond, unknown formation bond
Good pipe bond, poor formation bond



WELEX FIRST AGAIN!

Introducing . . .

a cement bond log that reliably logs both sides of the cement sheath

The new Welex Acoustic Cement Bond Log does the most complete job in the business. It "sees" the **formation acoustic bond** as well as the pipe acoustic bond. It works equally well in hard rock country, sand or shale.

Other logs show the pipe bond all right, but nothing about the formation bond. And they work well only in soft formations at that. Pretty limited. Not much to base a completion job on.

Using the Welex system, evaluation of the pipe and formation bond is possible in many areas with only the pipe and formation amplitude curves run in the cased hole. Under certain conditions, especially in hard rock country, the Welex Cement Bond Log employs three acoustic amplitude signals: one for the pipe, one for the formation after casing is set, and one in the open hole for formation evaluation before casing is set. A caliper log in the open hole can be run concurrently to provide auxiliary data.

Proper evaluation of the two—or three—curves locates precisely the area of the poor bond—whether pipe or formation. If squeezing is necessary, the logs tell you exactly where. The reliability of the new Welex Cement Bond Log has been proven in numerous tests.

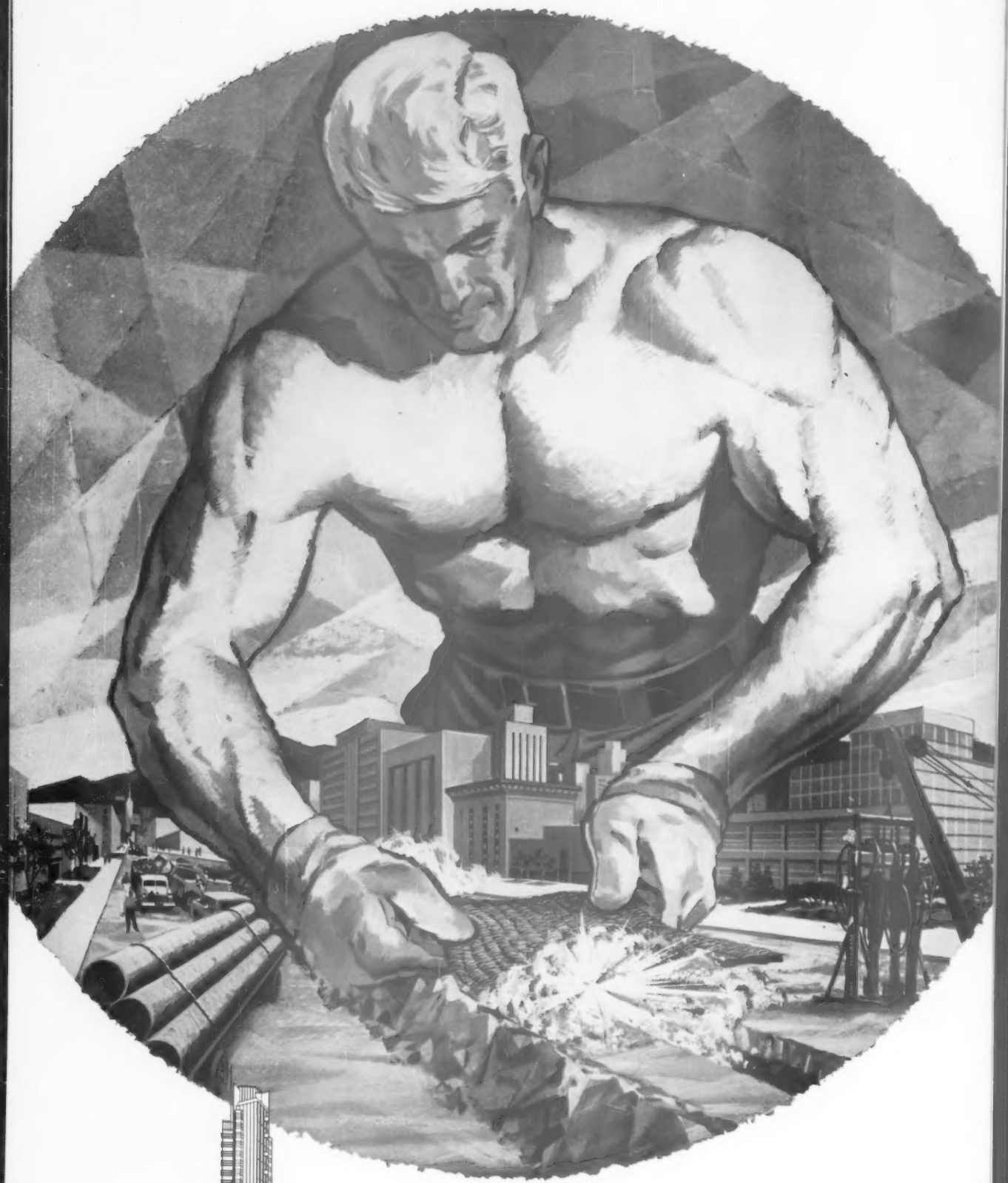
It is a fact that communication can occur behind the cement even when the pipe bond is good. This condition can lead to costly remedial work. By accurately logging **both sides** of the cement sheath, the new Welex Log can now save thousands of dollars per well. Let the man from Welex show you.

COMPLETE WIRELINE Welex SERVICES

WELEX

A Division of Halliburton Company

General Offices: 1728 Old Spanish Trail, Houston, Texas



"...pacing the pipeline construction industry
for more than a quarter century"

price tower

PIPELINE
H·C·PRICE·CO
CONSTRUCTORS

bartlesville, oklahoma
cable address: HCPCO

50 years ago

August 10, 1911

There is a hope among the producers of natural gasoline from casing-head gas that the high-gravity production which now troubles them may find its own market in competition with acetylene, Pintsch, Blau-gas, and similar manufactured products for lighting purposes.

With the finding of oil in every nook and corner of the world; with petroleum furnishing motive power for the navies of the earth; with the importation of petroleum products into the United States; with Standard Oil Co. dissolving; with foreign oil companies competing with American companies for trade on our own soil; with the Government looking after the leasing of oil lands . . . the old order of things changeth surely.

25 years ago

August 6, 1936

City officials of Texarkana, Tex., propose a $1,200,000 bond issue for the construction of a 10-in. gas pipeline from Rodessa field to the city for municipal and domestic purposes. Present gas rights of the Arkansas-Louisiana Gas Co. within the city will not be curtailed.

Secretary Ickes has issued a warning against persons or associations which represent themselves as government agents and solicit applications for oil or gas prospecting permits or leases on public lands. He said the interior department general land office had received letters from persons who said they had been approached by agents of associations claiming that for a fee they could file an application for a lease of oil and gas lands yielding great profit.

Eighty-four firms and persons have been indicted by the oil-marketing investigating federal grand jury in Madison, Wis., on charges of violation of the Sherman antitrust law.

10 years ago

August 2, 1951

Amerada Petroleum Corp. completed the first significant producer in the Williston basin, 1 Clarence Iverson in 6-155n-95w, Williams County, North Dakota. The well flowed 12 bbl. of 39°-gravity oil per hour with 290 M.c.f.d. from 10,490-10,530 ft. in Mississippian.

Arabian American Oil Co. bought the "Queen Mary" diesel-electric drilling barge from Creole Petroleum Corp. and towed the equipment 11,000 miles to the Persian Gulf. The barge is regarded as the largest and most complete of its kind in the industry. Aramco early this year inaugurated offshore drilling in the Persian Gulf with its Safaniya well.

JOURNALLY SPEAKING

Gasoline Horse Opera

CONTINUING the research into marketing we started last week, we are still completely baffled in trying to tell the good guys from the bad guys.

It's not at all like "adult westerns" on TV. In those horse operas you never have any doubt about who are the good guys and who are the bad guys (except for an occasional double-crosser who may masquerade as a good guy for a while, but he always gets exposed before the last commercial).

In gasoline price wars the bad guys are the guys who cut the price, and the good guys are the posse of citizens deputized to uphold order and decency. They all do a lot of shooting at each other with similar weapons (price cuts), to the great entertainment of the viewers (motorists), but it is supposed to be taken for granted that the good guys are shooting only to teach the bad guys that they never should have unholstered that six-gun in the first place.

All of which would be strictly according to Hoyle if only we could tell who shot first, who shot in self-defense, who's against whom, and what the shooting is all about anyway. You can't tell the players without a program, and nobody passes out programs.

As we explained last week, a decent respect for protocol requires each type of marketer to price his gasoline at a specific differential above or below another type of marketer. Anybody who doesn't is a bad guy.

For example, a private-brander can sell 2 cents under a major and still be a good guy. But if he also gives away green stamps or dishes he becomes a bad guy. Unless of course, everybody else does the same, whereupon all become either good guys or bad guys but we don't know which.

Now suppose a major acquires a chain of private-brand filling stations (and we have it on good authority that a considerable number of majors have done this, either openly or in supposed secrecy). The rules of the game say that he is still a good guy so long as he maintains the historic differential between major and private-brand prices. But the fact that he is working both sides of the street in competition with himself makes him a bad guy in many people's opinion.

Then there's the situation where a private-brander used to get his bulk supply from a certain source but a major offers to supply him a lot cheaper. If the private-brander then cuts his retail price he is, of course, a bad guy. But to this horse-opera viewer it looks like a case of a member of the posse slipping ammunition to the outlaws. On TV such a renegade would be properly exposed as a bad guy, but, as we said, this gasoline horse opera leaves us all confused as to who's who and who's doing what to whom.

After watching the picture for some time we are about to conclude that gasoline retailing is less like a TV mellerdrammer and more like a type of puzzle that used to be popular when we were a boy.

Maybe you recall such. A typical puzzle was a line drawing of a lot of trees and rocks and things, and if you turned the picture around a few times and squinted at it just right you would suddenly notice a face or two leering out among the foliage. The problem was to see how many faces you could locate.

Gasoline marketing seems to be just that sort of a picture puzzle. At first glance the picture looks like a perfectly normal pastoral scene. But you know that there are a lot of faces hidden in the curving lines. The problem: Find the bad guys.

—Henry D. Ralph.

The Step in the Right Direction . . .

rely on Warren

FOR

DEPENDABLE DELIVERIES OF

NATURAL GASOLINE

WHATEVER THE GRADE, WHATEVER THE VOLUME

WHERE YOU WANT IT
WHEN YOU WANT IT
AND THE
WAY YOU WANT IT

WARREN

PETROLEUM CORPORATION

TULSA, OKLAHOMA

EXPORT TERMINALS: CORPUS CHRISTI, PORT ARTHUR, BAYTOWN, TEXAS CITY AND WARRENGAS, HOUSTON, TEXAS, SAN PEDRO, CALIF.

This study of gas growth is overdue

THE AMERICAN GAS ASSOCIATION has taken a constructive and long-needed step in launching a factual study of the future requirements and supply of natural gas.

A top-drawer committee of executives, fortified with knowledgeable analysts, has been instructed to make an objective study of the long-range factors fostering or inhibiting the industry's continued growth.

MUCH PROPAGANDA has been circulated during recent years about the future outlook for the gas business, to the confusion of the public, regulatory agencies, and investors.

Spokesmen for gas distributors, among others, have shown little hesitancy in predicting that gas demand will continue to increase as fast as it did during the past decade. If for no other reason, caution should be bred by the experience of the oil industry which is currently in a jam because it believed its postwar growth would continue unchecked.

On the other hand, many producers have been predicting an imminent and severe shortage of gas supply. The fact that no shortage has yet been felt makes it appear to many people that they have been crying "wolf."

Some predictions of tremendous future supplies have adopted, without reservation or explanation, guesses as to how much gas nature stored in the ground, with no consideration of how much of this it will be economic, or even physically possible, to find and produce.

The AGA annual estimates of proved recoverable reserves, like the API estimates of crude-oil reserves, are considered by many people to be ultraconservative. But they are widely accepted as authoritative, and the trend they show could not sustain the projected demand growth for very many years into the future.

SO IT IS GOOD that a new group is undertaking a balanced appraisal of the facts and forecasts. Perhaps it will find:

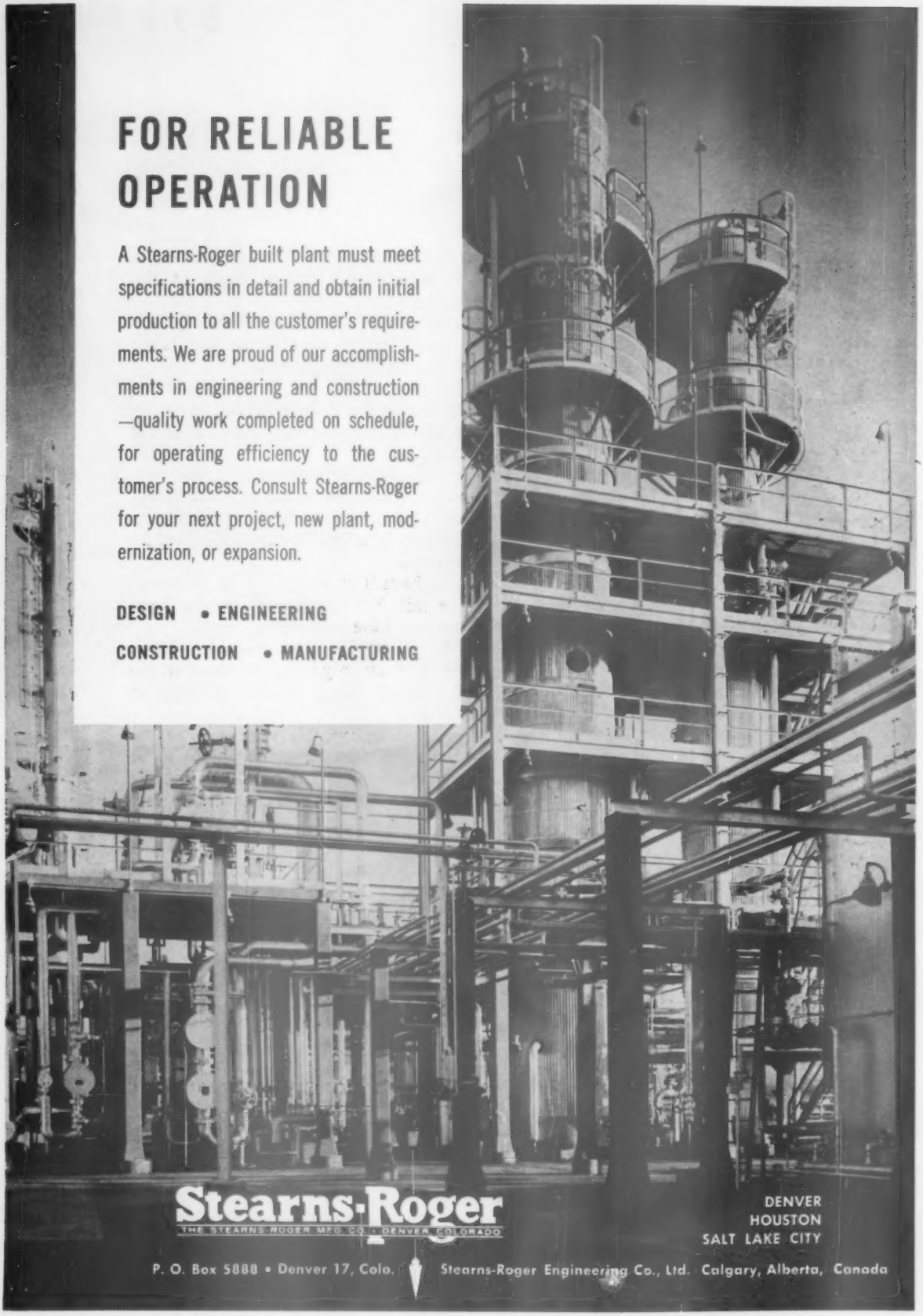
- That there is enough gas now to supply present customers for many years.
- That the future growth rate of both supply and demand will be governed largely by price.
- That the rate of growth in gas consumption will slow down, as it did with oil, unless gas can continue to capture new markets from competing fuels largely on the basis of low price alone.
- That much more gas remains to be discovered, but the new reserves will be much more costly to find and produce and that somewhat higher field prices will be needed to make them available to the market.
- And that if prices are freed to equate with competing fuels, the demand growth may slow somewhat but the reserve growth will increase so that the industry will be assured of a sound and healthy—if less tumultuous—prospect for many years into the future.

FOR RELIABLE OPERATION

A Stearns-Roger built plant must meet specifications in detail and obtain initial production to all the customer's requirements. We are proud of our accomplishments in engineering and construction —quality work completed on schedule, for operating efficiency to the customer's process. Consult Stearns-Roger for your next project, new plant, modernization, or expansion.

DESIGN • ENGINEERING

CONSTRUCTION • MANUFACTURING



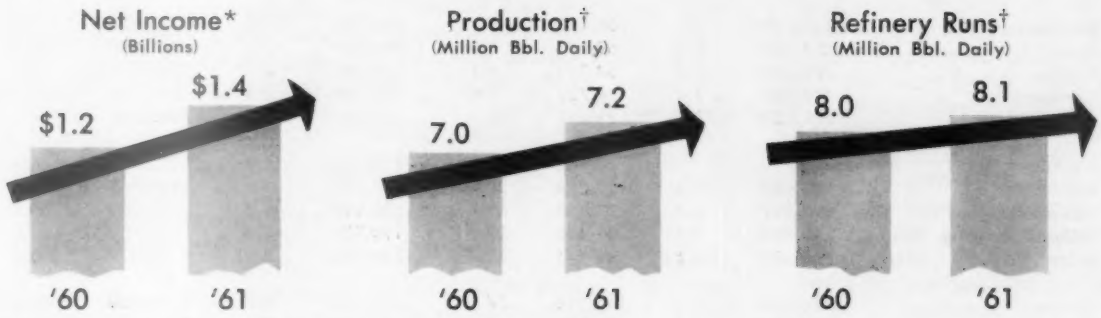
Stearns-Roger

THE STEARNS ROGER MFG. CO. • DENVER COLORADO

DENVER
HOUSTON
SALT LAKE CITY

P. O. Box 5888 • Denver 17, Colo. | Stearns-Roger Engineering Co., Ltd. Calgary, Alberta, Canada

First-Half Trends Are Up



*Twenty-one major companies. †Average for entire industry.

Majors Having a Good Year So Far

• First-half earnings are up 13.2% over the first half of '60, even with a so-so second quarter. Next half, say the companies, will depend on the level of crude production and refinery runs—and what happens to product prices.

REPORTS of the major integrated oil companies show the first half of 1961 generally was a period of good earnings.

The first 21 major domestic and international companies to report had total earnings of $1,437,885,000 compared with $1,270,527,000 for the same period last year. This is a 13.2% gain.

The overwhelming majority of companies recorded profit gains for the period. A few set new company operating records. Back of the greater earnings are reports of increased production and sales.

Only a few of the smaller companies engaged predominantly in production have reported. Some of them, too, recorded increased profits, but not enough have been published yet to form a pattern for that segment of the industry.

Top executives of the majors, in relaying the good earnings news to their stockholders, were quick to sound a note of caution about the prospects for the next 6 months. Their optimism was tempered by these facts:

... **Comparison** with the 1960 first half is tricky because many companies had rough sledding then.

... **Second quarter** of 1961 was slower for many companies. Their good first-half earnings stem largely from a good first quarter.

... **Trend of gasoline prices** and demand turned down in June and has continued for the first part of July. There's currently a firmer tone to wholesale gasoline markets, but it's still too early to determine if higher prices will stick.

... **General conditions** of oversupply may call for last-half cutbacks in crude production, a vital source of income.

What they say . . . "The price picture both here and abroad has created uncertainty about the outlook for the remainder of the year."

That's the way Socony Mobil President Albert L. Nickerson summed up the situation.

"Larger volumes abroad," he said, "have been accompanied by a steady weakening of prices generally in overseas markets. Additionally, wholesale gasoline prices in the U. S. have eroded badly in recent weeks, at just about the time in the year at which they strengthened in 1960."

Jersey Standard President M. H. Rathbone said the improvement 1961 is showing over 1960 so far cannot be expected to continue in view of recent price weakness in the U. S. and intensive competition abroad.

Indiana Standard President John E. Swearingen noted that earnings for the balance of the year will depend on whether recent attempts to firm up prices prove successful.

Henderson Supplee, Jr., president of Atlantic Refining Co., said recent gasoline price weakness coupled with disappointing demand point to an unsettled period ahead for the oil industry.

Paul E. Taliaferro, president of

How Some Majors Fared in the First Half

	Gross Income ($1,000)		Net Income ($1,000)		Refinery Runs (bbl. daily)		Liquid Production (bbl. daily)	
	1961	% Change*	1961	% Change*	1961	% Change*	1961	% Change*
Standard (N. J.)	4,488,000	4.4	385,000	22.2	3,123,000	10.2	2,707,000	7.5
Texaco	.....	...	198,726	12.1	.....	...	.....	...
Gulf	1,632,405	1.7	169,701	8.7	762,917	1.0	1,650,631	2.1
Socony Mobil	.....	...	108,800	30.5	1,018,000	5.7	829,000	3.1
Standard (Ind.)	1,026,600	2.6	74,177	14.3	.....	...	.....	...
Standard (Calif.)	1,024,719	4.5	136,482	6.1	544,700	11.2	1,086,000	13.0
Shell	934,532	3.4	69,983	1.0	504,000	0.2	331,000	−10.5
Phillips	607,290	0.7	54,902	6.1	234,000	−0.9	286,000	1.4
Continental	420,683	1.4	28,722	− 0.9	200,203	−1.4	199,415	− 0.4
Cities Service	501,059	1.5	23,919	28.1	253,038	−1.6	148,200	...
Sinclair	.....	...	23,162	6.9	393,470	−6.6	190,918	6.2
Sun	401,026	9.3	24,048	20.0	221,425	−6.9	157,940	6.0
Tidewater	354,521	3.4	14,718	−19.5	250,000	5.5	122,000	6.1
Atlantic Refining	290,724	4.1	21,649	22.0	190,700	−2.1	199,700	32.2
Union Oil	265,409	2.5	16,771	25.4	164,000	2.9	96,000	0.5
Sunray	238,536	4.4	21,916	17.0	150,850	4.5	79,800	−11.5
Ohio Oil	178,896	1.7	19,300	8.8	90,088	−9.6	118,591	10.5
Standard (Ohio)	186,422	2.4	11,649	6.3	133,263	−7.1	39,575	2.2
British American	159,210	0.8	13,267	− 3.4	129,700	5.6	38,400	6.4
Skelly	.....	...	11,813	6.5	51,709	3.5	64,818	2.4
Richfield	137,460	−21.3	9,180	−34.4	151,751	3.6	80,486	5.6

*Increase or decrease as compared with first half of 1960.

Sunray Mid-Continent Oil Co., expressed concern at the industry's current high level of refinery runs and the large excesses of product inventory overhanging the market. He said his company's second-half earnings will be influenced greatly by the prices received for refined products.

President L. F. McCollum of Continental Oil Co., gave this analysis of the last half to his stockholders:

"With industrial production and personal consumption expenditures again rising, the demand for petroleum products during the second half may show an increase of from 2 to 3% over the latter half of 1960.

"If this anticipated increase in demand is met primarily from the industry's surplus inventories, reasonably satisfactory profit margins should prevail during the second half of the year. On the other hand, if refinery runs and crude production are increased unduly, the industry's prices and earnings will be adversely affected."

Some records . . . New highs in various phases of company operations were reported by Socony Mobil, Gulf, Atlantic Refining, Cities Service, Sun, and Texaco.

Socony Mobil's world-wide operating volumes in the first half hit record levels. Gross crude oil production went up 3%; refinery runs rose by 5.7%; product sales were up about 5%.

Gulf's production, both in the U. S. and abroad, reached new highs. Domestic production averaged 350,800 bbl. daily compared with the previous high of 344,494 bbl. daily. World-wide production reached 1,497,000 bbl. daily compared with a previous mark of 1,466,000 bbl. daily. The company's sales of natural gas and refined products and production of natural-gas liquids also set records.

Gulf officials said increased earnings during the first half continued to come from domestic operations. The decline in refinery runs was more than offset by increased income from sales of crude and natural gas.

Cities Service's 28% gain in earnings stemmed from new records in most operations plus a continuing program to reduce costs.

Atlantic Refining showed a record 82% increase in liquids production which allowed the company to supply nearly 84% of its own crude requirements during the first half. Atlantic Refining has been moving fast toward a crude balance, with much of its increase coming from operations in Venezuela's Lake Maracaibo.

Both Texaco and Sun reported the highest first-half earnings in their histories. Texaco's net of $198,726,264 was a gain of 12.1% over the first half last year while Sun's net of $24,048,000 was a 20% gain.

Other gainers . . . Several other companies also turned in much better reports for 1961.

Jersey Standard's net of $385 million was 22.2% higher than last year at this time. Indiana Standard showed a 14.3% gain in earnings to $74,1 million for the half. Union Oil enjoyed a 25.4% increase in profits to $16.7 million. Sunray Mid-Continent's earnings jumped 17% to $21.9 million.

The other majors, with three ex-

(Continued on Page 221)

Area-Pricing Data Asked in Permian Basin

- FPC sets deadlines for producers to file certain cost and non-cost data.

Step still doesn't set any guidelines or standards.

THE Federal Power Commission last week set the stage for the start of an area-pricing approach in the Permian basin.

These are the initial steps:

... **Presentation** of general data by producers relating to the economic factors involved in the finding, producing, gathering, processing and sale of natural gas. This will be done in a hearing beginning October 3.

... **Individual filing** of specified non-cost data on the producer's operations and reserves by October 12.

... **Filing of cost data** for individual companies. Large producers must do this by December 29. At a later date smaller producers—those with sales of 2 billion cubic feet daily or less—will have to make a similar filing, but on a shortened questionnaire form not yet drafted.

Meanwhile, the FPC staff has been directed to compile by September 11 data relating to each filed rate schedule covering sales from the Permian basin area. Producers will have an opportunity to comment on these data and supply information on actual delivery conditions under each rate schedule by October 12.

The commission said it would not rule at this time on whether an individual company would be permitted to present evidence to substantiate a higher rate after an area rate had been determined.

What it means ... The current step is simply the gathering of detailed information.

It does not provide any standards or guidelines for establishing area prices.

It does not commit the commission nor the staff to any given approach in eventually establishing those prices.

Once the FPC staff has the data it is requesting, it will assemble the information in composite form to present to the commission. The commission will then have the task of deciding what use will be made of the data.

Up to this point, the company data will be confidential. However, any portion of the information which the commission then decides to enter into the record will become available to anyone interested. Any portion not entered in the record will remain confidential.

FPC staff officials point out that the commission ruled earlier this year that cost-of-service data would not be permitted. Other than that, however, there is no limitation on the use the FPC can make of the information it is seeking.

Non-cost data ... The October 12 filing will be done on a questionnaire, Appendix A, entitled "Operating Data." This is a 31-page form which includes recoverable reserves data and information on gas sales, well drilling activity, production and acquisition, disposition, gas gathering and compression, and gasoline plant operations.

The report on reserves will be on an annual basis for the years 1955 to 1960, inclusive. The FPC order provides that this information will not be incorporated into the record pending further orders by the commission.

Cost data ... Appendix B, which must be filed by large producers (2 billion cubic feet or more) by December 29 covers detailed company information concerning costs and statistics on oil and gas production, exploration, gathering and products extraction operations.

It includes 71 pages of instructions and explanatory notes in addition to 23 lengthy schedules to fill out. These range from detailed statistics on corporate general investment, such as land and buildings, equipment, furnishings and fixtures, etc., to a breakdown of intangible development costs, costs applicable to development wells and exploration costs, etc.

The FPC staff said the information being requested should be readily obtainable from a company's records. It said that both the schedules and the explanatory material were derived largely from the questionnaire proposed by producers at the time of the Permian basin pre-hearing conferences.

Last week's order was issued without action by either of the two new FPC members, Joseph Swidler and Howard Morgan. However, it was announced that the decision to issue the order was reached before the recent death of Commissioner Frederick Stueck and that he had participated in it, along with Commissioners Arthur Kline and Jerome Kuykendall.

No Progress Made in Louisiana Hearing

THE pre-hearing conference on initial area prices for southern Louisiana wound up last week on the same inconclusive note as the Permian basin sessions had earlier this year.

FPC Chief Examiner Edward Marsh said at the conclusion of last week's meeting that he would now report to the commission as he had done following the Permian basin conferences. He said he saw no value in continuing the conferences at this time.

The net effect is that little or no progress has been made in the pre-hearing sessions. The problem is now back in the lap of the FPC.

The brick wall the conferees ran into last week was failure to reach agreement on what price evidence should be submitted in a certificate case proceeding and how binding such a price line would be on contract prices.

There was general agreement among all segments that FPC must be more specific on what it wants, thus giving the industry some guidelines.

One producer suggested FPC make available the data it used, together with its line of reasoning, in arriving at the area price guide it originally suggested for the southern Louisiana area.

He said this would give the industry a starting point.

Handling of Crude-Import Program Hit

• Jersey Standard suit challenges Interior's sliding-scale formula; Sinclair claims inland-refiner quotas are making it suffer financial hardship.

TWO specific attacks were made last week on the manner in which crude-oil import controls are now being administered by the Department of Interior.

The legality of the sliding-scale formula for determining crude-oil import quotas in Districts 1-4 was challenged in a court suit filed by Standard Oil Co. (N. J.).

Sinclair Oil Corp., in a hearing before the Oil Import Appeals Board, claimed it is suffering undue economic hardship under the control program. It said this was due largely to the granting of quotas to inland refiners.

Jersey Standard charged, in a suit filed in a Washington, D. C., court, that the present method of establishing individual quotas by using different percentages for different refinery throughput volumes is unfair and illegal.

Jersey did not specify what plan should be adopted, but it obviously feels that the same percentage should apply to all—regardless of size of refinery runs.

It therefore asked the court to order Interior to discard the sliding-scale method.

Under present regulations, overall quotas are 9% of demand. But when a company gets a quota based on runs, the percentage depends on the size of the runs. For the first 10,000 bbl. daily, for example, the allowable is 11.1%. But for quantities of more than 300,000 bbl. daily, the allowable is 3.7% (see box).

Some "historic" refiners, including Jersey itself, get quotas based on a percentage of the amount they were importing during the base year (1957).

Even though it is now getting a historic quota, Jersey apparently feels that the day is not far distant when it would fare better under a refinery-throughput quota, particularly if the sliding scale were abolished.

Suit's charges . . . In its suit, Jersey charged that the sliding-scale formula is a discriminatory and arbitrary way of establishing quotas and that it does not conform to the presidential proclamation which established the mandatory control program.

In that proclamation, Jersey points out, Interior was instructed to allocate on a "fair and equitable" basis related to refinery runs—with a provision for taking into account the historical position of an importer.

But, Jersey contends, there is nothing fair and equitable about a sliding-scale approach which treats refiners differently.

"This is not just a discrimination between big and little," a Jersey spokesman said, "but discrimination between big and big and little and little, too."

This, in Jersey's view, can put one company at a disadvantage with a competitor.

Jersey says it has exhausted all efforts to get administrative relief, since it tried unsuccessfully to get the Oil Import Appeals Board to rule on its case.

Also, Jersey says, it waited until the new administration had time to hold import hearings and to consider changes in the program. Since nothing has yet been done, the company is now seeking recourse in court action.

This is the first major court test of the crude-import program, although Gulf Oil Corp. at one time last year filed — and subsequently dropped — a suit challenging the method of establishing residual fuel oil import quotas.

Sinclair's complaint . . . Sinclair, in its appearance before the appeals board last week, took an approach almost completely opposite to Jersey Standard's.

Sinclair claimed it is suffering economic hardship, and charged most of that hardship to the fact that inland refiners get quotas based solely on refinery throughput whether they are importers or not.

Sinclair's complaint is that it invested heavily in developing a foreign source of crude and that it then received a quota which made it impossible for it to recoup these investments.

The company, which had a quota of 6,826,400 bbl. for the second half of this year, asked for an increase of about 3,800,000 bbl.

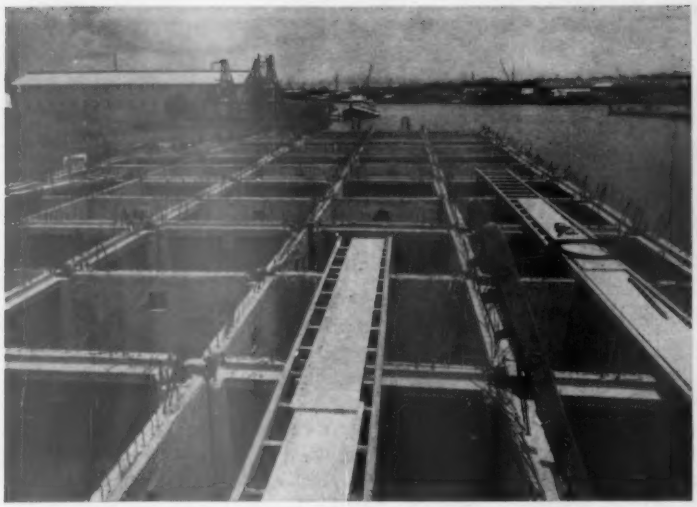
It said that since it cannot bring in a sufficient quantity of foreign crude under present rules, it is being forced to "buy back" its own foreign production from inland refiners who net $1 a barrel or more in the crude exchange.

Sinclair emphasized that it is not attacking the control program as such, nor any cut in import totals that may be necessary to prevent injury to national security.

Here's the Challenged Sliding Scale

Current method of determining import quotas is based on the scales below which were set up by the Government in June.

Districts 1-4		District 5	
Avg. B/D Input	% of Input	Avg. B/D Input	% of Input
0- 10,000	11.1	0- 10,000	42.1
10- 20,000	10.2	10- 20,000	32.9
20- 30,000	9.3	20- 30,000	23.8
30- 60,000	8.3	30- 60,000	14.1
60-100,000	7.4	60-100,000	11.3
100-150,000	6.5	100-150,000	10.3
150-200,000	5.5	150-200,000	9.3
200-300,000	4.5	200,000 plus	7.4
300,000 plus	3.7		



CRUDE is stored in some cells of concrete barges, while other cells are flooded to emplace the structures.

New Look in Barges: They're Made of Cement

• Concrete production-storage barges are winning favor in South Louisiana inland waters. Their low rigging cost gives them a big selling point.

THE SHALLOW waters of South Louisiana have been sprouting a new kind of production and storage barge. It's made of Portland cement.

Since the first one was delivered a little more than a year ago, a number of majors and independents have acquired at least one of the structures. About 15 are at work in the Louisiana inland waters with depths up to 10 ft. And more are on order.

Builders of the concrete barges claim several advantages over conventional pile-driven platforms and steel barges:

. . . **Production equipment** may be loaded on the barges at dockside and floated to location.

. . . **Maintenance costs** are low. There is no corrosion problem.

. . . **No mat is needed.** The barges sink into the mud bottom, remain stationary, and resist underwashing from tidal action.

. . . **Storage space** for crude is built into the compartmented barges, while additional storage may be added topside.

. . . **The barges are competitive** in price if internal storage and deck area are considered.

Vermilion Enterprises, Metairie, La., is the owner and developer of the "Crete-Bar" barges, and Belden Concrete Products, Metairie, is the contractor.

Construction . . . The barges consist of a large number of precast modular units—or cells—which are tied together by cast-in-place slabs and pilasters.

A barge that is 70 ft. long, 30 ft. wide, and 12 ft. deep contains eight multicell watertight compartments. Six of these are flooded to set the barge in place. The others are available for 1,800 bbl. of crude storage.

Normally the freeboard for the 12-ft.-thick barge is sufficient in the shallow inland waters. However, for deeper waters up to 10 ft. a superstructure may be added to provide a second deck—and in some cases a third deck is added for extra space.

The normal barge has a 5-in.-thick deck engineered for loading of 1,800 lb. per sq. foot. Draft of the hull is 4½ ft., and displacement while afloat is more than 300 tons.

Advantages . . . Probably the most compelling advantage of the concrete barge over the conventional platform built at the production site is the low rigging cost.

Also, equipment may be installed on the barge at the dock.

The barges are expected to remain useful for as much as 30 years as permanent installations.

The developers point out that the barges may be moved at will simply by pumping out the water and refloating.

Safety is another feature. The barges are fireproof and their weight makes them resistant to high waves and winds.

Uses . . . The barges have a variety of uses—everything from simple storage to supporting an ACT unit.

Gulf Oil Corp., for example, has mounted an ACT unit on a concrete barge in the West Delta area. The barge, incidentally, is landlocked. The operators dug a canal to float it into place and then backfilled.

Another producing company has a 10,000-bbl. steel storage tank on the deck along with 3,000 bbl. of internal storage. Others use barges to support gas compressors.

Vermilion Enterprises hopes to use the concrete principle in still another way: For underwater storage of crude. It has designed a 10,000-bbl. unit to withstand hydrostatic pressures and forces necessary for dry storage of crude in water 100 ft. deep.

JOURNAL EXCLUSIVE

Where the Russian Gas Industry

A first-hand report on U. S. delegation's USSR trip.

No. 1 of a series by former FPC member W. R. Connole

About Connole:

WILLIAM R. Connole is an unusual, sometimes controversial young man.

He was only 32 years old when he was appointed to the Federal Power Commission in 1955, the youngest appointee to a federal regulatory agency.

Prior to that, he had been the youngest person to serve as general counsel of the Connecticut Public Utilities Commission.

During his 5-year term at the FPC in Washington, Connole was frequently in the limelight because of his views and his vigor in expressing them. He was not particularly popular with his associates, but they respected his sharp mind.

As a whole, the gas industry didn't seem to have much regret when President Eisenhower refused to reappoint him, remarking that he could get a better man.

After his departure from the FPC last year, Connole went into private law practice in Washington.

He played an active role in promoting the current exchange visits by U. S. and Russian natural-gas delegations.

While the Journal has disagreed with Connole at times, it has found him to be an alert observer with an ability to express himself well. For that reason, it arranged for him to write an exclusive series of articles on the visit of the U. S. group to Russia.

SIXTEEN thousand miles of new large-diameter pipeline and a 500% increase in gas production (from 1 trillion to 5 trillion cubic feet per year) between 1959 and 1965! These tremendous goals, already partially met, give some impression of the booming natural-gas industry within the Soviet Union.

The American gas-industry delegation, touring the USSR last month under sponsorship of the American Gas Association as part of the State Department's East-West industrial exchange program, was educated in depth about this nationalized industry.

We found an intensive program of exploration and development for all hydrocarbon reserves, but especially for gas. We saw a fully developed pipeline-construction industry organized along conventional U. S. industry lines and using familiar construction techniques. Any pipeliner in the U. S. could take his place in the organization, or "trust," as it is called, and go right about his day's work. This observation applies equally to design engineer, welder, back hoe operator, or almost any other profession or skill.

No competition . . . But the factor that makes such progress possible also accounts for the chief difference between the industry in the U. S. and the USSR.

GLAVGAS, the ministry with overall responsibility for expansion of the natural-gas industry, operates with a singlemindedness of purpose and with a freedom from the "distractions" of competition that is possible only in a totally state-oriented economy.

One soon appreciates that every working man and woman, from Premier Khrushchev down to the humblest stablehand, is an employe of the government; that every pipe-wrench, welding torch, and office building is owned by the state; that there is no one to question and, once the government has decided on a project, no one to whom to justify expansion of new facilities. Only then does the explanation for rapid growth become apparent.

The delegation traveled thousands of miles throughout European Russia, visiting every important gas-producing area and observing at first hand the methods of production, pipelining, and distribution.

We were guests at several of the "institutes" where engineers and technicians are trained and where advanced methods of technology are developed and tested. We were given an apparently candid and certainly impressive blueprint of the prospects for natural gas behind the Iron Curtain. Nothing that was particularly outstanding about the industry was denied the delegation.

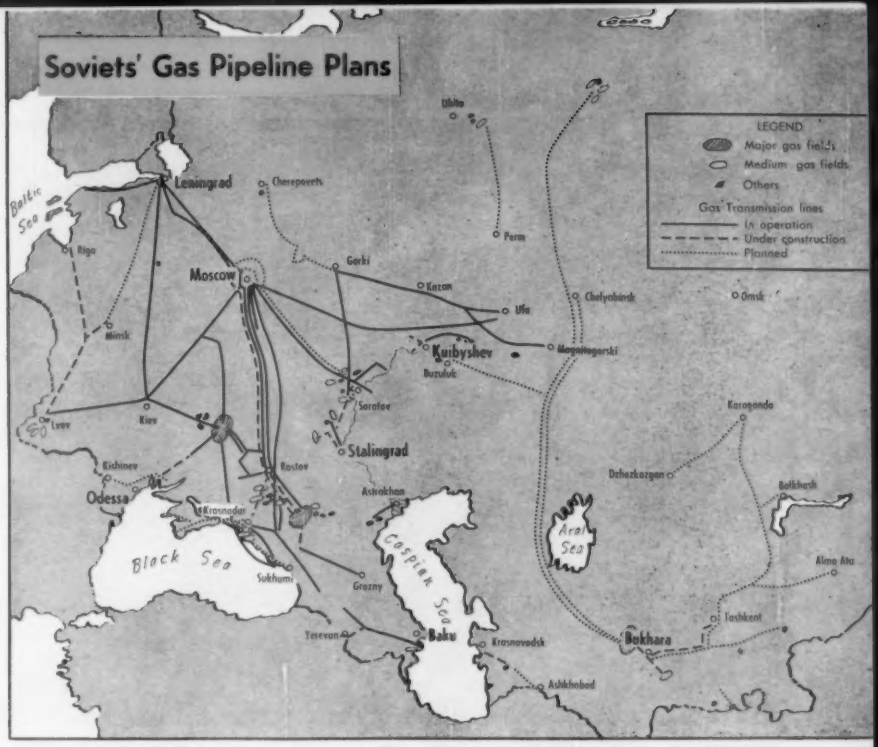
Plainly, the men in the soviet gas industry are proud of their success, eager to share their knowledge with others, especially Americans, and avid for information on the industry in the U. S.

American technical journals are in evidence everywhere. Libraries in cultural and technical centers are well filled, both with reading materials and readers. The Oil and Gas Journal is devoured from cover to cover and translated into the several tongues used in the multi-nationality oil country

We were questioned everywhere concerning our opinion of the state of their industry. Any indication that we were pleased or impressed was received with genuine satisfaction.

U. S.-type equipment . . . It is clear that the industry looks to the U. S. for leadership. The construction equipment is strangely familiar, the compressor stations remind one of any of several in the U. S. One is forever examining nameplates on gas reciprocal engines, turbines and

Is Headed



compressors—not for ratings, but for the well-known marks of American manufacturers whose products they so closely resemble.

Construction practices, especially in buildings, are woefully wanting. Everything seems sacrificed for speed. Standardization and prefabrication seem to be the most important rules in the building construction industry.

There is a great excess of labor. Of course, in a country where every adult is guaranteed an annual wage (about 22 new rubles, or $24 per week), there is little incentive for the government, for whom everyone is working, to change this state of affairs.

Demands on the industry . . . Although there is certainly no problem of "regulatory lag" nor any concern for competitive public hearings on "mutually exclusive" applications for pipeline construction, the industry is not without its problems of demonstrating an odd kind of "public convenience and necessity." It works this way:

The State Ministry of Gas Industry (GLAVGAS) exercises top management control over the industry. It is subordinate to the Council of Ministers, however, since it is a branch of the state referred to as "industry," as opposed to "government."

Each annual construction budget, therefore, must be cleared by GOSPLAN, the super economic unit of the Council of Ministers. Here, along with the proposals of the other "industrial" ministries, the plans are weighed and evaluated against available resources and the overall political and economic goals of the USSR.

There are at least these two significant differences that distinguish the soviet from the American scheme. They are:

. . . Top government originates expansion policy for the industry as well as considers proposals that are submitted to it by GLAVGAS. And this policy may be dictated by considerations having no relation to the financial feasibility of the proposed projects.

. . . Expansion follows a carefully worked out, long-range plan for the comprehensive development of all the resources of the Soviet Union. Currently, goals being aimed at are part of a 7-year plan ending in 1965.

Great importance is given to this national planning idea. The soviet concept of competing with the United States in all phases of its industry is seen here also. One expression of this claim of superiority of the soviet-planned economy appears in one of the papers presented to the International Gas Union in Stockholm just before our delegation entered the Soviet Union. All of the members of the delegation were in attendance at that meeting. The authors, Sorokin and Trebin, said,

"Despite the considerable lag of the length of the operating gas mains grid in the USSR behind the length of such grid in the USA, the Soviet Union does not aim at overtaking the USA in this respect. This index does not characterize any economic superiority but rather shows absence of plan and private-ownership methods of construction of gas mains grids in the USA carried out by individual companies.

"Under the conditions of planned economy in the USSR gas transportation and distribution can be carried out by means of a gas mains grid of lesser length in spite of the vast territory of our country."

At all the installations the delegations visited, sign boards and banners were mounted above doors, across the front of buildings, and in other conspicuous places. There were invariably several carrying the slogan "Peace and Friendship" and at least one showing a graph comparing the rate of increase in the particularly activity in the U. S. with that in the USSR, always projected to 1965, the end of the 7-year plan.

When asked why this comparison was invariably made to the U. S. and to no other nation, an official said, "Simple. It is because you are the best."

Whatever the incentive, there is no doubt that the natural-gas industry in the USSR is getting a major push from the present occupants of the Kremlin. In 1947 the first large-diameter lines were built from Stavropol to Moscow with American line pipe and compression supplied through lend-lease. The natural-gas industry was given relatively little attention until 1956, when GLAVGAS was established. The real boom has taken place since that time.

Big-inch lines . . . Heavy emphasis is placed on large diameter pipelines. At the present time more than 40% of the total pipelines in the USSR are of 720 mm. diameter

WOMEN do a great amount of work on Russian pipelines, as U. S. gas delegates found out. This woman is helping to wrap a section of a 40-in. line.

(28 in.) or bigger. Present practice calls for line pipe of 1,020 mm. (40 in.) wherever possible.

We observed the laying of a portion of this 40-in. line south of Moscow near Tula.

This line will be the third to Moscow from the Stavropol-Krasnodar area in the Crimea. Construction details will be considered in another article. Of interest at this point is the makeup of the spread carrying out this work.

About 50% of the personnel were women. While this is a typical proportion for all work groups in the Soviet Union, it is still difficult to become accustomed to seeing women digging bell holes or driving big D-7-type sideboom tractors. Perhaps the most unusual feature of this spread, however, was the attractive young woman engineer in charge of the entire train of cleaning, coating and wrapping, and laying-in equipment!

When we inquired where the line pipe was being rolled for this and the other 40-in. pipeline construction, we were advised that there would be sufficient mill capacity within the country to supply all the needs of the industry within a year.

It is apparent that imported steel meets much of the demand now.

Little was said concerning the Italian "barter" line pipe about which so much of the rest of Western Europe is concerned, but obviously at least some is being used. On the portion of the line that we observed, the line pipe was all of West German manufacture.

Gas discoveries . . . Huge discoveries of gas have been made in recent years in the Volga region, the Ukraine, the North Caucasus, Siberia, and Central Asia. One of the largest fields in the world has been found in Uzbekistan, at Gazli, not far from the ancient city of Bukhara. This field's reserves are estimated at 14 trillion cubic feet.

It is from the latter area that the twin 40-in. lines are being built for 4,500 km. to the important industrial centers east of the Urals. These lines will be powered with 17 compressor stations at 120-km. intervals, will cross burning desert, and pass through 1,000 km. of Siberian forest. Its capacity is proposed at 21 billion cubic meters annually.

Future plans . . . Additional reserves in the Caspian area will be tapped by a huge ring carrying gas to the industrial area in the southern and eastern Urals. The 7-year plan calls for a line crossing the ancient deserts where the caravans of Marco Polo and the hordes of Tamerlane once roamed. It is completed as far as Samarkand and Tashkent. It is proposed to bring gas to all the republics of Central Asia within a few years.

Soviet technicians are extremely optimistic concerning the extent of the reserves in the Soviet Union, particularly in the Asiatic republics. The Gazli field alone is claimed to contain more fuel equivalent than all the coal mined in the Donbas, Pechora, and Moscow basins, the chief coal deposits in the European part of the Soviet Union.

Great activity is also taking place in the western part of the Soviet Union. The fields in the Near Carpathian area now supply part of the needs of the city of Kiev, White Russia, and soon will be connected with Leningrad and part of the Ukraine.

The famous Shebalinka field in the Ukraine supplies Moscow, the Ukraine, and Kiev. Here a large new pipeline is being completed.

What U. S. Gas Delegates Did in Russia

DATA on the visit of the delegation of U. S. gas men to Russia:

Entered Russia July 1. Spent 9 days in Moscow talking to government gas officials and inspecting Moscow's gas-distribution system.

Visited gas fields in several parts of Russia and inspected gas pipeline construction sites. Left Russia July 29.

Members of the U. S. delegation: E. H. Smoker, president United Gas Improvement Co., Philadelphia; Baxter D. Goodrich, senior vice-president of Texas Eastern Transmission Corp., Shreveport; H. A. (Tex) Eddins, president, Oklahoma Natural Gas Co., Tulsa; Paul Kraemer, vice president, Minneapolis Gas Co.; Robert Stewart, vice president, Phillips Petroleum Co., Bartlesville; Frederick Batten, vice president, Columbia Gas System, Inc., New York; Samuel J. Cunningham, senior research engineer, American Gas Association, New York, and William R. Connole.

E. H. Volski, interpreter, and Hillis Lory, U. S. Department of State, accompanied the delegation.

The Stavropol - Krasnodar fields, northeast of the Black Sea, serve Moscow through the existing two lines of 700 and 800 mm. diameter and the 1,020-mm. line under construction. They also supply Leningrad and the Don River basin.

The Baku area supplies the Armenian and Georgian republics and soon will be joined to the rest of the system through the North Caucasus.

The Volga-area fields supply the huge industrial loads of the city of Gorki and will be linked with the system to Moscow by the end of this year.

Uses of gas . . . The Soviet Union uses gas chiefly for industrial purposes, although Moscow uses great quantities for space heating in the thousands of new "flats" or apartments that are mushrooming throughout the suburbs of the city. Most space heating in these buildings is by means of big central stations. We saw one that served more than 30,000 Muscovite apartments.

The 7-year plan calls for:

". . . a change of fuel balance structure by means of priority development of the output and production of the most economic kinds of fuel, oil and gas . . . In 1965 to insure oil output of 230-240 M.M.t., gas output and production of 150 billion cubic meters."

It is expected that the share of the total fuel needs for electric generation met by oil and gas will change significantly in this period. Oil's share will increase from 10.9% up to 17.8%, while gas will climb from 2.6% to 24.8%. Thus, natural gas will supply nearly one quarter of all fuel used for electric generation in the Soviet Union by 1965.

Another indication of the importance of the industrial and boiler-fuel loads is the change in recent years in the proportion of total gas consumption that goes for these purposes. Between 1957 and 1959, industrial consumption increased 1.9 times, while electric-generation use increased by 2.4 times.

Soviet oil threat . . . Make no mistake about it, the Soviet Union is going all out to develop its gas industry as an important source of domestic energy. It will soon displace huge quantities of coal and, even more significantly, millions of tons of oil. Where that displaced oil will find a market, at what price, and on what terms is one of the most profound speculations that the growth of the soviet natural-gas industry requires the Free World to consider. It may have lasting worldwide effects.

In our journey through the Soviet Union, the American delegation witnessed some striking technical progress being made by the soviets in their efforts to develop their gas industry. Some of the most important examples, and some of the experiences we met while observing them, will be related in a subsequent article.

Ruling on Texas Gas Fields Stirs Confusion

PRODUCERS and pipeline purchasers in several Texas gas fields last week were left wondering which end is up.

A cloud of confusion settled over three fields when the Texas Supreme Court struck down as invalid one method used by the Texas Railroad Commission in prorating gas production.

The method is the so-called "Henze" type of allocation, named after the field where it was first applied.

Henze-type rules have been in effect in more than half a dozen Texas gas fields, the most notable being big Puckett Ellenburger field in West Texas' Pecos County.

The court decision left operators and pipelines in these fields completely in the dark as to what allowables actually have been over a several-month period, who is overproduced, who is underproduced, and by how much.

The Supreme Court ruling was issued in a case involving gas production in Buffalo and South Buffalo fields in Leon County.

M. B. Rudman, Dallas independent, and others brought suit against the commission. They sought to overturn orders forcing them to shut in six gas wells to make up what the commission determined was overproduction during a 5-month period from August to December 1959.

The District Court upheld Rudman et al. It was reversed by the Court of Civil Appeals, now reversed in turn by the Supreme Court.

Can't be retroactive . . . The Supreme Court held that Henze-type proration violates the Texas statutes dealing with gas allocation.

It does so, it said, because it attempts retroactive assignment of allowables after the gas has been produced. Whereas the statutes, it said, require the commission to determine the demand for gas in a field and set an allowable in advance of production.

Under Henze-type allocation, the commission assigns a percentage factor giving each operator his fair share of production according to the field allocation formula. Total field allowable for a certain month is simply whatever volume is produced during the month.

The percentage factors then are applied by the commission to officially come up with each producer's allowable in cubic feet.

The commission regards the percentage factor itself as the allowable and thus contends it doesn't attempt retroactive application.

Puckett hit, too . . . The court's decision apparently invalidates not only the Buffalo and South Buffalo proration setups, but also all others using the Henze-type system.

The court specifically mentioned Puckett field. In 1956, it had upheld the Henze order in this field as legal when contested by Phillips Petroleum Co. In this newest decision, however, the court admitted that the Puckett and Buffalo situations were alike, that it had erred in the Puckett decision, and that it now "reconsiders its refusal of Phillips' petition a writ of error."

New motion coming . . . A spokesman for the Texas Railroad Commission said last week that the State of Texas will file a motion for rehearing with the court on behalf of the commission.

watching WASHINGTON

Price Control . . . an ever-present threat

• No one knows whether or when direct economic controls may be applied. But Clyde La Motte, the Journal's Washington editor, outlines the chances.

THERE can be little doubt that the path upon which President Kennedy set this nation's feet in his July address is a path that skirts the very brink of economic controls, including prices and wages.

This does not mean that such controls are imminent. No one knows. At this point, government economic planners see no need for them unless we are forced into a shooting war.

But while the nation is readying itself for a fight—just in case, it is also readying the tools for economic action—just in case.

It is no big secret in Washington that various agencies, led principally by the Office of Civil and Defense Mobilization, have specific, detailed measures ready for use at an instant's notice.

These blueprints for economic action include such indirect control measures as higher taxes, the possible restoration of an excess-profits tax, higher interest rates, tighter credit control, etc.

The plans also call for direct measures: Control of prices, wages, and rents.

Listen to Edward P. Phelps, Jr., deputy assistant director, economic stabilization, at OCDM:

"The federal Government, given a limited-war mobilization, has as its present policy the total use of the complete arsenal of indirect and direct emergency economic measures early in any mobilization for such a limited war."

That is plain enough, isn't it?

Two sets of plans.

Government economic planners are mapping their courses on two different bases: Nuclear war and limited "conventional" fighting.

Nuclear war would, of course, bring quick and extreme control action.

In a limited war or an extended near-war situation, the approach would be more deliberate, requiring top-level decisions as to how much control and when.

For example, the Defense Production Act as it now stands does not give price or rent-control authority to the executive department. Any move to these controls would require congressional action. That would take time, unless a sudden and extreme emergency forced Congress into an immediate step.

It may be, as we settle down to a long, tense war of nerves, that the administration will ask for standby authority to impose controls.

"Psychological inflating."

Surprising as it may sound to some, many of the government planners—including Phelps—think a limited war should not bring on price controls.

Note that they say "should not." They don't say "would not."

Their studies indicate that the U. S. has enough excess productive capacity in virtually all fields to carry us through a limited war of limited duration.

However, what they do fear is "psychological inflation" that could force the Government into price and wage controls even when they weren't really necessary.

Phelps explains it this way:

"Unhappily, based both on experience and on judgment as to the possible future, a psychological inflation, one generated by fear and uncertainty, by jockeying for position, by wondering what is going to happen next, could very well be set in motion.

"It probably would have some relationship to the kind of inflation which occurred in the Korean conflict, not really related to severe shortages, nor to a rapidly expanding economy."

Even if the psychology of the situation should bring about some form of direct economic control, it is unlikely that this would be accompanied by rationing, particularly of consumer goods. The reason: The adequacy of supply.

What lies ahead.

The oil industry and others should be aware that controls will be in the offing as long as the tense world situation exists. And that's likely to be a long, long time.

Hear Phelps again on the subject of control:

"It would be difficult, controversial as always, aggravating and irritating, and there would be plenty of deficiencies, but it is possible for the federal Government to do this kind of job and to undertake it without substantial warning.

"We have a pretty good inherent and prearranged readiness to do this today, if we have to."

Any questions?

Don't let its compact size fool you

This Baker Model "A" Retrievable Tension Packer is a versatile performer —and it's economical

Just how versatile is the Model "A"? You can use it for waterflooding. For simple frac or acidizing jobs in shallow or low fluid wells. In wells with damaged or defective casing where retrievability of any packer would be doubtful. And many other uses.

In fact the Model "A" is about as versatile as your needs are varied. You can set and reset it as often as you want, in a single trip. And you can use it over and over because it's built to last. It's easy to maintain, and parts are available from convenient Baker stocks.

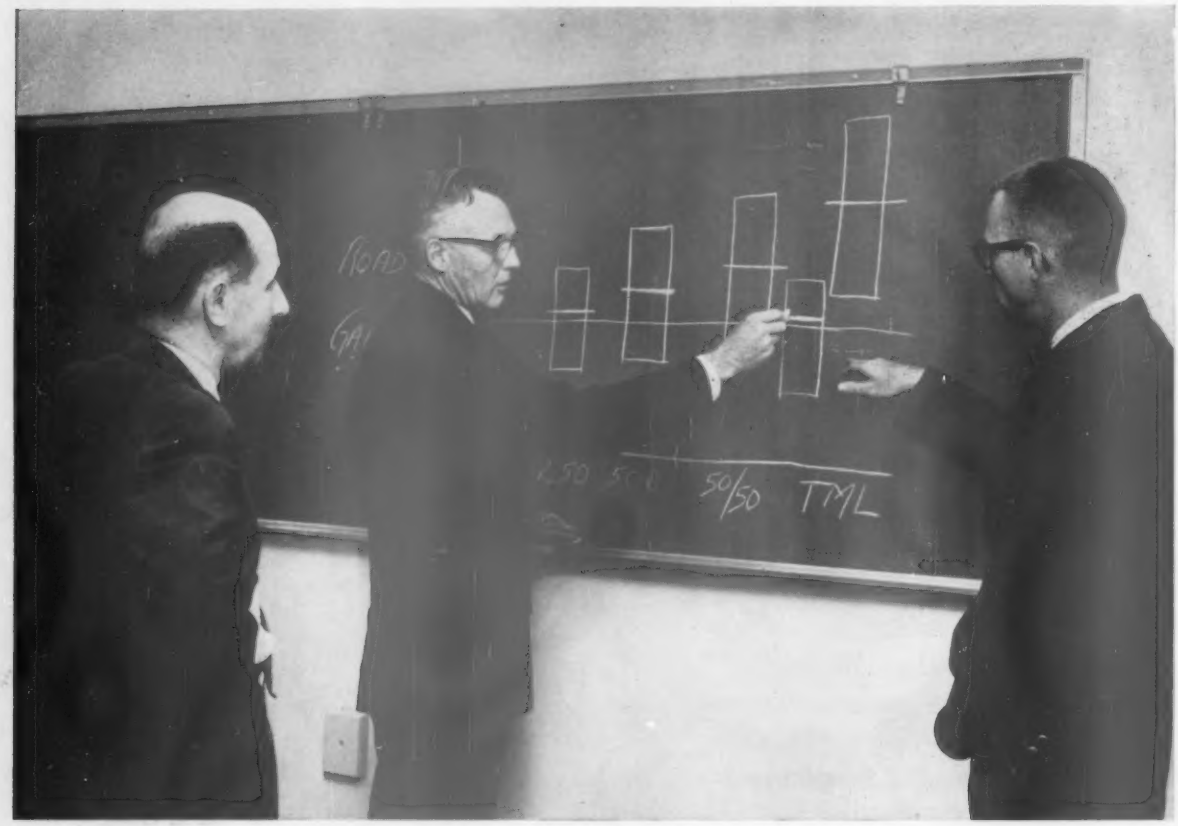
Can you rely on a packer so compact and economical? You can. The Model "A" is simple in design. It contains proven Baker components, such as rocker-type slips, performance-proved packing element, *and two separate safety release systems.*

Learn more about this hard-working packer. Ask your Baker man for Bulletin 334. Or, write Baker Oil Tools, Inc., P.O. Box 2274, Terminal Annex, Los Angeles 54, California.

BAKER
MODEL "A"
TENSION PACKER

BAKER OIL TOOLS, INC. HOUSTON | LOS ANGELES | NEW YORK

Product 739-A



1. Cost savings and/or improved gasoline performance can now be realized by the refiner through proper antiknock selection. Sneed works closely with oil company technical people on such matters. Here he shows recent data on the road bonus that can be expected from various "Ethyl" antiknock compounds now available.

2. To check on the effectiveness of phosphorus additives in a customer's fuels, Dick set up a cooperative test program at Ethyl's Research Laboratories. He will review these data on spark plug performance with the oil company during his next visit.

3. Comparing Ethyl's road test results with those of an oil company, Dick discusses a program being conducted on the customer's "indoor highway." Ethyl's broad fuel-engine experience is often helpful to the refiner in evaluating his data.

Liaison Man—Ethyl's Dick Sneed

Research Representative in the Gulf Coast and Mid-Continent Regions

If you have a question on the fuel/engine relationship, Dick Sneed is the man to see. Your questions are his first interest. If you have a problem, chances are he has already solved a similar one.

He's one of the competent engineers at Ethyl's Research Laboratories in Detroit. Like other Research Representatives, Dick spends about 60% of his time in the field. His specific job: to act as liaison between the oil companies' research and technical people and those of Ethyl, exchanging information, and coordinating Ethyl's research activities to be most useful to the customer.

Dick joined Ethyl in 1935 immediately after graduation from Oklahoma University. One of his first assignments was the evaluation of increasing compression ratios to better utilize higher fuel antiknock quality. Another was to study the effect of supercharging on engine performance and fuel antiknock requirement. He also worked on Ethyl's study of the road antiknock behavior of TML and the mixed lead alkyls in the late thirties.

During the war years he evaluated a wide range of fuels and lubricating oils in Military power plants. These and other important research duties account for the experience and knowledge Dick uses so effectively in his present assignment.

ETHYL
ANTIKNOCK COMPOUND
ETHYL CORPORATION

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ETHYL CORPORATION OF CANADA LIMITED, TORONTO
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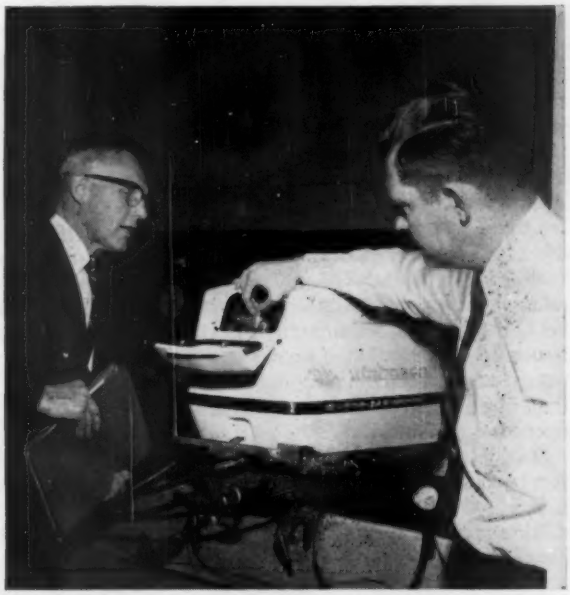
4. One of Sneed's most important activities is bringing new technical information to refining management people. In this case he is reviewing the highlights of an Ethyl report on the economic balancing of processing and antiknocks with an oil company executive.



5. The growing outboard market has increased the need for knowledge of the fuel-engine relationship in two-cycle engines. Sneed is getting, for a customer, the latest data on "Ethyl" ethylene dibromide as an oil additive to overcome spark plug fouling.

CONTACTORS at Rimbey gas plant take 2,500 gal. of amine solution per minute.

Economy Stressed at Rimbey

• Outdoor construction lowered cost of Canada's No. 1 gas-processing plant. Operating expense was cut, too.

TWO BIG "FIRSTS" add luster to Alberta's newly dedicated Rimbey gas-processing plant: It stands first in capacity in Canada, and it is the first major gas plant in the country to use outdoor-type construction.

Process units at Rimbey are in the open. They're insulated to operate in 40-below weather.

Buildings in the 250,000-sq.-ft. main process and utility area have been held to a minimum. They house equipment that needs frequent maintenance and facilities that must be kept inside to avoid operating problems.

The outdoor approach lowered Rimbey's construction costs. And it is credited with making the $12.5-million plant more compact and efficient.

Rimbey, which has a capacity of 326 million cubic feet daily, is 90 miles southwest of Edmonton. The plant lies between Westerose South (Dick Lake) gas field and Homeglen-Rimbey gas and oil field. It processes gas from both fields, and is owned in varying proportions by 27 companies with producing interests in either or both of the fields.

British American Oil Co., Ltd., a major share owner, operates the plant.

Rimbey is capable of delivering 280,000 M.c.f. daily of sales gas to Alberta Gas Trunk Line, in accordance with contract quantities of 170,000 M.c.f. daily for Trans-Canada Pipe Line and 110,000 M.c.f. daily for Alberta & Southern Gas Co., Ltd.

Role of plant . . . Besides natural gas for industrial and domestic use, Rimbey can produce daily 103,000 gal. of propane, 134,000 gal. of butane, 12,600 bbl. of stabilized condensate, and 250 long tons of sulfur.

The plant has been on stream since early this year. It was officially opened in late July.

E. D. Loughney, president of B-A, says a pipeline will be built this year to carry condensate from Rimbey to Edmonton for use as refinery feed stock.

Rimbey features . . . Operating units at Rimbey include facilities for amine treating, gas chilling, low-temperature demethanization, condensate stabilizing, fractionation, refrigeration, and a glycol and sulfur plant.

Rimbey scored several other firsts for Canadian gas-processing plants. They include these:

. . . Hydraulic turbine is used for power recovery in the amine system.

. . . High-pressure demethanizers reduce recompression horsepower.

. . . Aerial coolers are used for all process cooling.

. . . Self-sufficiency in utilities has been accomplished. Rimbey generates all of its own electricity with steam turbine-driven generators, and the high-pressure steam is later used as low-pressure steam in plant processes. Water for boiler feed and other uses is obtained from wells drilled on the plant site.

. . . Centrifugal compressors are used in the plant's refrigeration system instead of the more conventional reciprocating compressors.

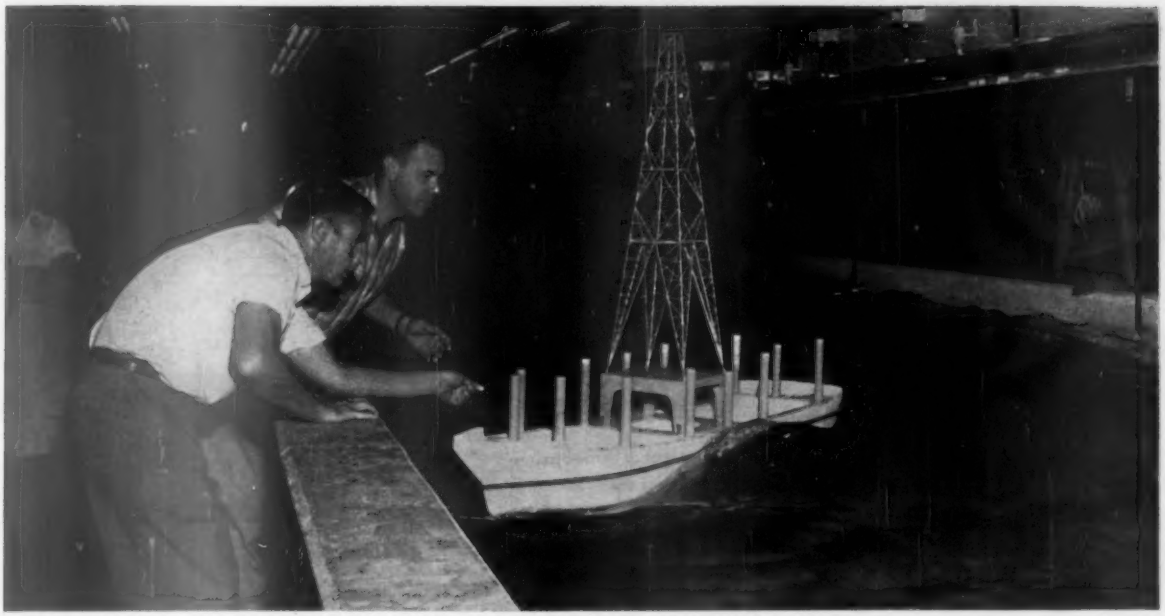
Low-cost factors . . . Although it has larger throughput, Rimbey cost only half as much as another big B-A gas-processing installation: The $25-million Pincher Creek plant.

Outdoor layout accounted for much of the economy in Rimbey's construction. But another reason for the difference in cost between the plants lies in the nature of the gas involved.

Acid components of Pincher Creek field gas are four times greater than acid components of the gas used in Rimbey processing—16.94% and about 4%, respectively—and the Pincher Creek acid-removal system had to be correspondingly bigger.

B-A gained another big saving at Rimbey by using the centrifugal compressors rather than reciprocating compressors in refrigeration. And since all process cooling is done by aerial coolers, no cooling-water system was required and there have been no water-treating costs.

B-A estimates it made a 30% over-all saving by making one plant do the work of two.



MODEL of CUSS II rides out "12-ft. waves" at San Diego test lab. Dowels circling hull simulate loaded conditions.

Big Drilling Ship Under Construction

A NEW drilling ship capable of making in excess of 15,000 ft. of hole in any depth of water will go into service early next year in Gulf Coast waters.

Global Marine Exploration Co., Los Angeles, has its CUSS II under construction in the New Orleans yards of Equitable Equipment Co. CUSS II will be similar to its sister ship, CUSS I, but will be specifically designed for offshore drilling from hull up.

CUSS I is a converted Navy YF (yard freighter). It has gained wide acclaim for its deep-water drilling off California and more recently for coring in 11,700 ft. of water off Baja California as part of the Mohole project (OGJ, April 10, p. 72).

CUSS II incorporates many of the ideas of CUSS I, but also has some new wrinkles. The new ship will have a bigger draw works capacity (2,000 hp. vs. 1,750), more hook-load capacity (500 tons vs. 300), and more cargo space (3,500 tons vs. 1,500).

These added capacities will enable CUSS II to drill the deeper wells expected along the Gulf Coast and to handle deeper jobs than the CUSS I. The new ship has the capacities to drill the Mohole, which is expected within the next 2 years, but no contractor has been selected for the job. The Mohole is planned as a 15,000 ft. hole in water 12,000 to 15,000 ft. deep.

No price tag was set on the CUSS II, but the ship and its equipment will cost in the neighborhood of $3 million.

Self propelled . . . The CUSS II is designed so that it can be modified to become a self-propelled vessel.

If the ship is converted to its own power, it would be the first offshore-drilling vessel of any type which could move on its own from one location to another. This feature was built into the design in case the vessel is called on to make a long trip.

Initially, CUSS II will be towed from location to location. However, the seven diesel-electric units which will power the drilling equipment are being designed so that they can be switched to power twin-screw motors on the vessel. Some equipment would have to be added to make the vessel self propelled, but the design makes this conversion possible.

Equipment . . . The special-designed 136-ft. derrick on the CUSS II will stand amid ships and drill through a 24-by-22-ft. well.

Global Marine officials in Los Angeles are lining up the equipment which will go on the ship.

The increased cargo capacity will enable the contractor to carry 15,000 ft. of 5½-in. drill pipe and 12,000 ft. of 9⅝-in. casing. The pipe will be racked in trebles forward of the derrick and handled by automatic equipment.

Below decks the ship will have room for 4,800 sacks of dry mud, 2,500 sacks of cement, 10,020 bbl. of drilling water, 1,800 bbl. of fuel oil, and 880 bbl. of potable water.

Anchors will hold the ship in position in water up to 600 ft. deep. The ship would use dynamic positioning.

The contractor's marine engineers have designed the ship to drill under heavy sea conditions.

It also will be more stable than the CUSS I since it will be slightly larger. The CUSS II will be 267 ft. long, 58 ft. wide, and have a displacement of 550 tons.

The CUSS II will be Global Marine's fourth drilling vessel. And it will mark the company's first venture in the Gulf Coast.

Sun Cuts Octanes for Bottom Grades

• Gasoline-rating reduction is latest strategy in Charlotte, where price war has bubbled since launching of nine-grade plan. Sun's idea is to meet private-brand competition by adding quality differential to price spread.

AN OCTANE reduction in gasoline sold in the price-war-ridden Charlotte, N. C., area is being made by Sun Oil Co. on its lower grades.

The move reflects a new phase of Sun's test of nine-grade marketing in Charlotte, the company explains. Sun introduced its nine-grade plan in the area the first of May, with its Sunoco 190 and 180 being priced 1 cent and 2 cents respectively below major regular brands.

The strategy was aimed at competing with private brands which traditionally undercut the majors—generally by 2 cents a gallon.

Sun's introduction of the new economy grades, meeting private-brand prices, touched off a price war that has raged almost continuously since.

Last week there had been an uneasy truce of several days. Sun and American Oil, Sun's most determined price pursuer in recent weeks, were selling their bottom grades at 28.9 cents a gallon. Sun regards its Sunoco 200 as its regular, rather than the economy 180 or 190 grades.

Other majors were 1 cent above this level, or 2 cents below the former normal price. Private brands were at 27.9 cents. However, this new structure was regarded as only temporary. The majors aren't willing to be undersold by a major competitor, even by a penny, and the private brands don't believe they can tolerate a differential of less than 2 cents.

New octane numbers . . . Sun's latest step in effect adds a quality differential to match the price differential it has tried to establish.

The company last week registered new minimum octane ratings for its nine grades, priced 1 cent apart, with the North Carolina Gasoline and Oil Inspection Board. This action complies with a new state law requiring notification of any change in gasoline quality.

Sun's new ratings are 89 Research Octane Number for Sunoco 180, 91 for 190, 93 for Sunoco 200, 94 for Sunoco 210, 96 for Sunoco 220, 97 for Sunoco 230, 99 for Sunoco 240, 100 for Sunoco 250, and 102 for Sunoco 260.

The new ratings are 2 numbers lower on 180, 1.5 lower on 190, and 1 lower on 200. The new top octane—260—was increased and the intermediate blends of basic 180 and 260 were adjusted slightly.

Ralph A. Leister, Sun district manager, says the reductions stemmed from a study of the buying habits of motorists in the area where the company's nine-grade program is in effect. Besides Charlotte, this area has been expanded during the last month to include all Sun stations in Gastonia, Lincolnton, Shelby, Concord, Albemarle, Salisbury, and Kannapolis in North Carolina, and Rock Hill, S. C.

"Purchasers of our grade 180 and grade 190 blends in the Charlotte area are operating cars which perform very satisfactorily on lower octane fuels than we have been supplying," Leister said.

"Our analyses of engine requirements convinces us on that score. Consequently, under the custom-blending concept of fitting fuels to engines, we are tailoring the octane quality of Sunoco 180 and Sunoco 190 to more closely match the needs of these cars, and we will determine consumer reaction to this change as part of our continuing study."

Although the industry is still divided as to the most economical method of marketing gasoline in two, three, or nine grades, the new lower octanes will satisfy a large share of the cars on the road.

Ethyl Corp.'s annual review of gasoline quality indicates that about 60% of all cars on the road at the end of 1960 were capable of operating on 89 octane fuel at light knock level. About 40% would have been satisfied at trace knock level.

Competing octanes . . . Before last week's octane change, Sun's bottom grade, priced 2 cents below major-brand regular, was half an octane number below the Charlotte average of 91.5.

Sun's second grade, priced 1 cent below major regular, was a full number above the Charlotte average reported in the Ethyl survey. The average is based on eight samples of major and private brands ranging from 90.5 to 92.4.

Sun's 200 grade, priced competitively with major brands, was 1.6 RON higher than any regular sample tested in Charlotte.

The new octane ratings place the two bottom grades below the average in Charlotte by one half and 2½ numbers, while the third grade is 1½ RON above the average.

Competitors stand pat . . . Sun's competitors said last week they had no plans to alter their octane quality.

In response to Sun's statement

Pipeline

Development of underground storage in the Perrysburg pool, Cattaraugus County, New York, is planned by Iroquois Gas. It has asked FPC approval to develop the pool, which would entail construction of 2 miles of 16-in. line, 5.5 miles of 12-in., and about 14 miles of small-diameter gathering lines. The field would have a capacity of 2.8 billion cubic feet. Buffalo is Iroquois' major market.

A 21-mile 18-in. gas line will be laid in Vermilion Parish, Louisiana, for Trunkline Gas by Glaser Construction Co. Work on the project has begun.

Crossing of the Red River is part of a 39.6-mile 30-in. pipeline construction job which Stanley-Bledsoe

that Sunoco 200 would continue to be its "regular-priced grade," other marketers indicated they would still meet the prices of Sunoco 180, the lowest-priced grade.

So for the time being, the latest development in Charlotte presages only a slight change in the battle lines and continued prosecution of the war. There have been no apparent countermoves to cope with the Sun strategy.

The meaning of Charlotte . . . The serious price battle at Charlotte is being watched closely from several angles.

The most obvious are:

. . . Sales results. Sun, in its widely publicized "cent - a - grade" experiment in New Castle, Del., experienced a 98% increase in volume after installing the nine-grade system last October. Its standard elsewhere is six grades through a custom-blending pump. A sales boost in Charlotte, confirming the pilot results, would be a strong argument for extending nine grades.

. . . Effect on private brands. All majors have been looking for a means of curbing independents' growing share of the market through price competition. If Sun's economy grades—lower in quality and price—achieve this purpose at Charlotte, other marketers will be forced to consider something similar.

One Rod String Pumps Four-Zone Well

TIDEWATER Oil Co. is trying out the world's first four-zone pumping installation using only one string of sucker rods.

The unusual completion is the company's Willie Wilson No. 9, near Duncan, Okla. It's a 1,795-ft. well, with the four zones lying between 1,469 and 1,625 ft.

Tidewater already has six three-zone wells producing with only one string of rods each.

The four-zone well produces through the main 2-in. pumping string and three 1-in. auxiliary strings inside 7-in. casing. The strings were made up at the surface, clamped together, and run as a unit. Pump is an Axelson-Garrett quadruple-zone pump.

On its initial 24-hour test, the well produced a total of 144 bbl. of oil at twelve 34-in. strokes per minute.

Gulf Plans Houston Petrochemical Plant

GULF Oil Corp. will develop a new petrochemical complex about 30 miles east of Houston. The complex will include an ethylene plant which will double Gulf's ethylene capacity.

Gulf confirmed last week it has optioned a 1,000-acre site on Cedar Bayou near Mont Belvieu to build the plant to produce ethylene, propylene and other petrochemical products. The site also will be available to other companies which will use Gulf's ethylene.

The ethylene plant, with a capacity of more than 400 million pounds annually, will be completed by mid-1963.

Gulf has an 850-mile pipeline from West Texas into the Houston area to deliver ethane and propane to the projected plant. Also it owns a 170-mile products line into the Beaumont-Port Arthur area from Houston.

The company has underground storage facilities in the Barbers Hill area east of Houston, and the complex may be located in that vicinity. Gulf did not announce the exact location.

The plant, Gulf said, will include such facilities as a laboratory, units for cooling water and water treating, power installations, maintenance shops, and office space.

Briefs . . .

Corp. will do for United Gas Pipeline Co. The line will run from Avoyelles Parish to LaSalle Parish, Louisiana.

Laying of a 35-mile 26-in. gas line from Cow Island to Jennings, La., has been started by Sharman, Allen, Gay & Taylor, Inc., for Trunkline Gas.

Work has started on construction of 65 miles of 30 and 36-in. loops from the vicinity of Fulshear, Tex., to the vicinity of New Roads, La., for Transcontinental Gas Pipe Line. Houston Contracting Co. is handling the job.

Two Houston Contracting Co. spreads are at work on the 161 miles of 20-in. gas line from West Monroe, La., to Kosciusko, Miss., for Texas Eastern Transmission. One spread is working out of Monroe, La., and the other out of Rolling Fork, Miss. Pipe laying was scheduled to begin early in August.

The National Museum of Transport in St. Louis has added a pipeline engine to its collection of historic transportation tools. The twin-cylinder Cooper - Bessemer engine was one of the first natural gas engines and the last horizontal engine bought by Interstate Pipe Line. It was bought in 1929 and ran until 1960, handling an estimated 75,000,000 bbl. of oil in that time.

American Petrofina plans to build a 133-mile, 6-in. products line from its Mount Pleasant, Tex., refinery to the Dallas-Fort Worth area. Capacity will be 10,000 bbl. daily with a single pump station at the refinery. The new line will tie into an existing terminal at Grapevine, midway between Dallas and Fort Worth. A new terminal is planned at Greenville.

Nearly 60 miles had been trenched and about 25 miles of line laid on the Western Pacific crude-oil line in British Columbia by August 1. Contractors expect to complete 180 miles per month and to finish the entire 504-mile project this fall. Initial throughput is expected to average 20,000 bbl. per day.

Progress on the proposed coal pipeline to the East Coast is reported by Texas Eastern Transmission. Texas Eastern is working with Consolidation Coal on the project. It says "substantial momentum has been gained by recent technological developments in coal slurry utilization."

Dig up to 800 feet of trench an hour—6 to 12 inches wide, as deep as 6 feet—with International 340 and ladder-type trencher.

For toughest digging, as deep as 13¼ feet, team the International 460 with heavy-duty No. 95 backhoe.

For general purpose trenching to 10-foot depth the International 340 tractor and No. 65 backhoe offer outstanding value.

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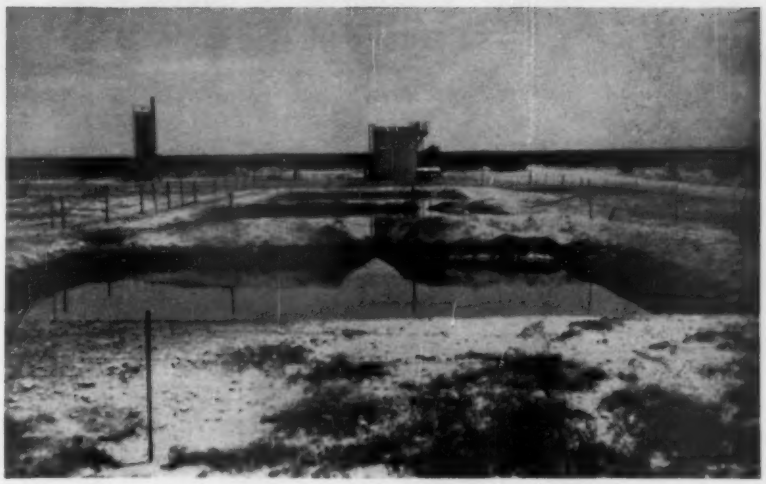
INTERNATIONAL HARVESTER

Spraberry Pollution Dispute Flares

. . . over unlined brine-disposal pits



OPERATORS in the Reagan County portion of big Spraberry Trend Area field in West Texas have been called on the Texas Railroad Commission carpet for alleged pollution of fresh-water beds in the area.

The commission is acting on complaints of the Reagan County Water and Supply District and Commissioners' Court.

Reagan County officials charge that salt-water seepage from unlined oil-field surface pits in the Spraberry has already at least partially polluted shallow fresh-water sources under about 30,000 acres in the county.

They want the commission to bar operators in this area from using such unlined pits for brine disposal.

Hearing on the petition was held in Austin July 26.

77,000 tons of solids . . . Ed L. Reed, consulting ground-water hydrologist for the applicants, told the commission that Reagan County's water supply is ground water coming from two shallow beds—the Comanche Peak limestones and the Trinity.

Reed said he had made an extensive study of surface-pit disposal in the Spraberry area and its effects on the fresh-water sources. The study, he said, shows that about 77,000 tons of solids are going into the Comanche Peak and Trinity waters in the area each year.

The hydraulic gradient in the Trinity in the area is 8 ft. per mile to the southeast. Quick action on the part of the commission, Reed said, is needed to head off serious contamination.

County and water district officials and landowners joined the Midland engineer in pressing for a quick order.

Several landowners told the commission fresh-water wells on their properties had become briny.

Z. I. Ashcraft, president of the water district, said the city of Big Lake gets its water from these ground beds via 22 miles of 14-in. pipeline. It can't afford to have this water ruined, he said.

Operators seek delay . . . Operators appearing at the hearing testified that the pollution problem isn't nearly as bad as pictured.

Most objected to any across-the-board order prohibiting use of unlined pits. And a majority sought a year's delay in the effective date of any order the commission might adopt.

Humble Oil & Refining Co. said fresh-water samples taken from its Reagan County Spraberry leases showed a maximum chloride content of 334 p.p.m., indicating the water to be unmodified. It asked that any order issued permit ordinary pit disposal of brine volumes not exceeding 15 bbl. a day and that lined pits be permitted for brine volumes over this amount.

Humble operates 25 scattered leases totaling 10,240 acres in the area involved (OGJ, July 24, p. 42).

Tidewater Oil Co. contended elimination of surface pits now probably would cause premature abandonment of oil wells. It asked a 12-month delay to give operators time to work out unit and cooperative agreements. Humble, Cities Service Oil Co., Phillips Petroleum Co., and others also sought a year of grace.

Sinclair Oil & Gas Co. urged that the commission make exception for economic hardship in any order it might write.

Willing to go along . . . Reed said the Reagan County officials and water users would be willing to go along with the operators on a year's delay in effective date of the order. But they would not favor anything beyond that, he said.

The Midland hydrologist vigorously opposed Humble's proposal for permitting continued use of unlined pits for brine volumes of less than 15 bbl. daily. His calculations, he said, show that 15 bbl. of Spraberry water a day would yield 125 tons of solids each year.

Hearings to spread? . . . One prominent Reagan County operator told the Journal he thinks it extremely likely that use of surface pits will be banned in the Spraberry.

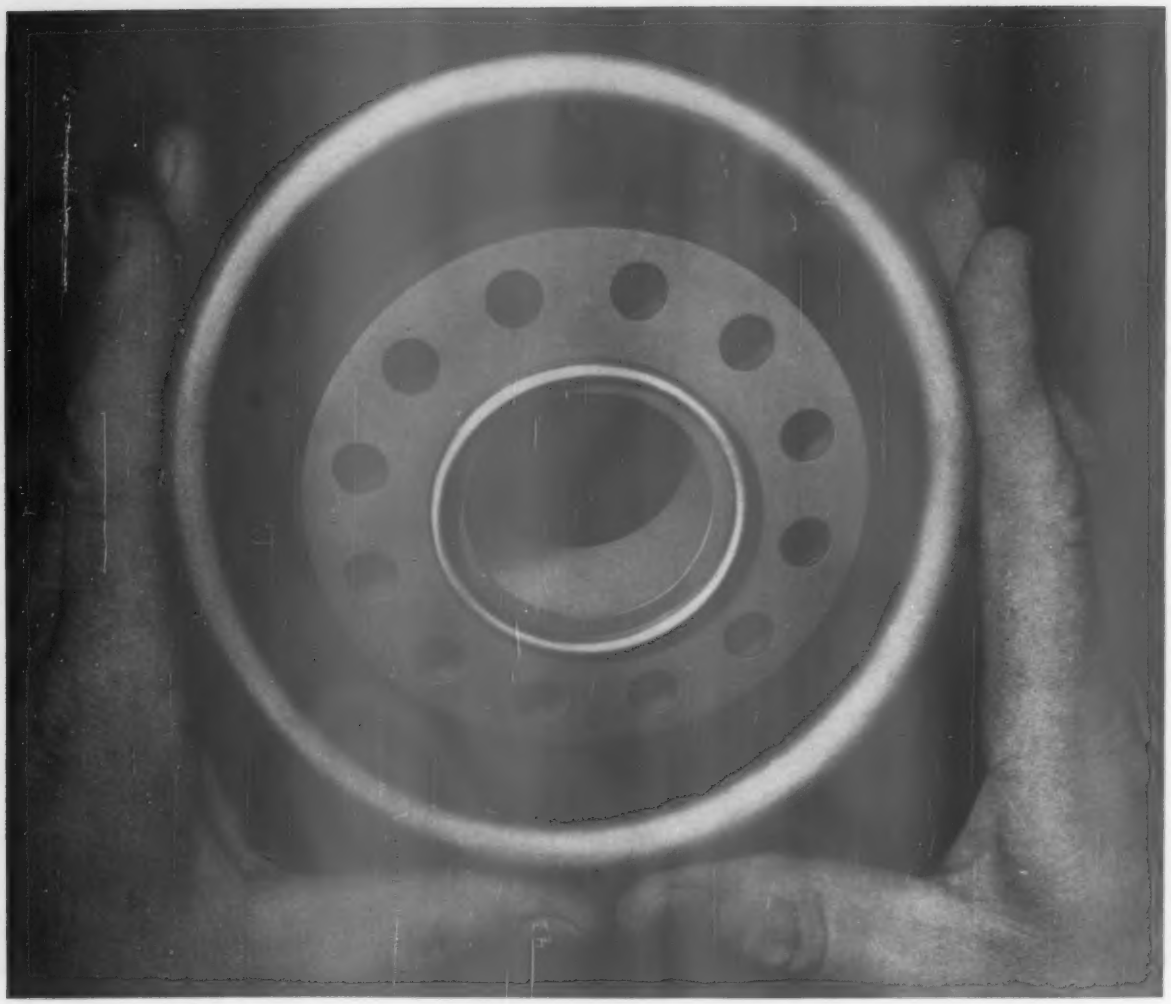
"It is only a matter of time until other counties and water districts act, too," he commented.

The operator said there is little doubt that oil operations are polluting the shallow fresh-water sources.

Action expensive . . . It is going to cost Spraberry operators a potful of money if use of surface pits is banned—especially if disposal must be underground.

A spokesman for one large unit now under development says a study indicates an underground-disposal system would cost the unit about $200,000.

Multiply this over the field and it comes to quite a wad.



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Ikard to head API in Washington

IT IS virtually certain now that Rep. Frank Ikard (D.-Tex.) will become a vice president of American Petroleum Institute in charge of API's Washington operations.

Although neither API nor Ikard has officially confirmed this, it is understood that Ikard has been offered the position and that he has accepted it.

Formal announcement may be delayed until the end of the current congressional session.

The move is an apparent effort by API to strengthen its Washington operation. Because of the increasing involvement of the Government in oil-industry operations, many in the industry feel that a stronger oil "voice" is needed badly in Washington.

Ikard, now serving his sixth term as congressman from the thirteenth district (Wichita Falls) in Texas, has long taken an interest in oil-industry affairs and is considered well-versed in oil problems.

Ikard is a prominent member of the powerful House Ways and Means Committee which takes initial action on all tax measures.

He is considered as one of the more influential members of the House.

Big Suppliers Join Transco

. . . project to build a southeastern LPG pipeline. Union, Texaco, Conoco, Atlantic, and Mobil are new partners.

TRANSCONTINENTAL Gas Pipe Line Co. is acquiring a large group of producer-suppliers as partners in its project to build a southeastern LPG pipeline and should be ready to make a formal announcement of its plans within a week.

Transco itself had no statement last week on the much-discussed pipeline, but industry sources said several major companies which are also suppliers of LPG have joined forces with the Houston transmission company to build the line and guarantee a throughput.

The line will operate in direct competition with Dixie Pipe Line Co., now building a line from east of Houston into the southeastern states.

Companies which are reported to be working with Transco include Texaco Inc., Continental Oil Co., Union Oil Co. of California, Atlantic Pipe Line Co., and Mobil Oil Co. Also Sinclair Pipeline Co., which is associated with the rival Dixie line, was reported interested in the Transco line.

Transco's subsidiary, Trans-Southern Pipeline Corp., would supervise construction of the line and operate it.

Last fall Trans-Southern announced plans to construct the line, but the project received a temporary setback when several potential suppliers formed Dixie to build their own line.

Jet-Perforating Firms Charged in Antitrust Suit With Conspiracy

THE Justice Department has filed antitrust suits charging six oilwell servicing companies and one allied firm with conspiring to control patents on jet perforating.

The purpose of the "conspiracy," the Justice Department said, was to control and restrict the use of the jet process.

The firms involved do more than 95% of the $26-million annual business involving the jet process, the Government claims.

The six firms named as defendants are: Borg-Warner Corp., Chicago; Dresser Industries, Inc., Dallas; Halliburton Co., Duncan, Okla.; McCullough Tool Co., Los Angeles; Pan Geo Atlas Corp., Houston, and Schlumberger Well Surveying Corp., Houston.

Jet Research Center, Inc., of Arlington, Tex., was the seventh defendant named. The Government identified it as "a producer of materials for the jet-perforating process."

The complaint specifies six actions which it says make up the "conspiracy." These are:

. . . **Pooling patents,** patent rights, technology and know-how relating to the jet process.

. . . **Exclusive licensing** for all the defendants' jet process patent rights. The "agent," the Justice Department claims, is Borg-Warner, acting through its Byron Jackson Division at Los Angeles.

. . . **Requiring licensees** to accept licenses in the pool in order to get any, and to make available to the pool any related patent rights.

. . . **Using harassing** litigation and threats of litigation alleging patent infringements "to compel competitors to accept patents from the patent pool."

. . . **Denying the sale** of jet perforating process supplies by Jet Research to non-licensees of the patent pool.

. . . **Discouraging** price competition.

Drawings on Leases Halted

INTERIOR Department has been ordered to stop—at least temporarily—its practice of holding drawings to determine priorities of filing for expired leases of public land tracts in New Mexico, Utah, and Wyoming.

A federal district judge in Washington last week enjoined the Secretary of Interior from further use of the procedure until a trial had been held on the test case.

Under the practice, started in 1959, a period is set aside for filings on expired leases. All of the filings during this period are considered simultaneous, and a drawing is then held to determine who gets the lease.

The purpose is to give everyone an even break, and to prevent a scramble at deadline.

However, the Thor-Westcliffe Development Co. of Santa Fe, N. M., challenged this procedure on the grounds that the first persons to file after a lease expires should get priority.

A Look at Southwestern Refinery Runs for June

HERE IS a look at crude runs in those states where figures are available from state regulatory agencies.

Louisiana

(Refinery Runs in Barrels Daily)

Company and location—	June	May	June 1960
Cities Service, Lake Charles	159,708	165,083	165,069
Continental, Lake Charles	49,746	50,088	46,841
Humble, Baton Rouge	313,582	296,263	300,980
Ingram, Meraux	19,053	18,501	15,902
Shell, Norco	106,876	109,502	96,894
Tenneco, Chalmette	46,020	46,219	22,700
Other	7,734	7,733	8,465
Total Louisiana	702,719	693,389	656,851

Mississippi

Paluxy, Yazoo City	1,669	1,669	1,064
Pontiac, Hattiesburg	14,835	16,311	14,126
Southland, Sandersville	5,608	4,573	6,324
Total Mississippi	22,112	22,553	21,514

Arkansas

American, El Dorado	40,844	38,972	34,209
Lion, El Dorado	34,705	35,744	33,013
MacMillan, Norphlet	3,679	3,558	3,783
Other	6,130	6,600	6,202
Total Arkansas	85,358	84,874	77,207

Texas

American, Texas City	114,313	145,163	114,205
Am. Petrofina:			
Mount Pleasant	16,074	15,530	14,101
Wichita Falls	8,238	8,468	9,042
Atlantic, Port Arthur	26,372	65,462	65,896
Col-Tex, Colorado City	7,514	7,509	9,068
Continental, Wichita Falls	13,314	10,013	12,468
Cosden, Big Spring	25,267	28,357	30,387
Crown Cent., Houston	34,603	35,358	32,332
Delhi-Taylor:			
Corpus Christi	39,956	28,100	28,541
Port Isabel	5,393	83	6,010
Eddy, Houston	2,149	1,821	2,198
El Paso, Odessa	13,362	13,186	13,735
Gulf, Port Arthur	226,895	240,018	261,886
Howell, San Antonio	2,727	2,654	2,221
Humble, Baytown	256,568	254,709	270,641
La Gloria, Tyler	16,892	13,616	15,755
Mobil, Beaumont	215,084	226,394	209,351
Phillips:			
Phillips	71,976	69,650	59,982
Sweeny	63,598	58,258	56,527
Plymouth, Texas City	35,144	34,225	27,753
Pontiac, Corpus Christi	48,155	42,251	48,316
Premier:			
Fort Worth	7,381	7,451	7,692
Longview	3,125	2,928	5,531
Pure, Nederland	69,787	80,047	82,593
Shamrock, Sunray	25,000	24,132	18,669
Shell, Houston	119,926	120,914	113,050
Signal, Houston	54,978	54,313	49,243
Sinclair:			
Corpus Christi	14,580	19,263	31,488
Houston	78,321	126,567	134,927
Skelly, Longview	3,686	3,993	3,081
Southwestern, Corpus Christi	37,127	25,160	37,857
Stand. Tex., El Paso	50,291	49,660	51,401
Suntide, Corpus Christi	36,925	35,390	39,384
Texaco:			
Amarillo	17,008	10,742	17,318
El Paso	12,071	11,520	13,585
Port Arthur	227,158	243,074	*303,193
Port Neches	42,245	37,254	42,008
Texas City, Texas City	31,695	33,641	31,872
Other	21,469	29,793	21,263
Total Texas	2,096,367	2,216,667	2,294,570

*Includes condensate.

Producers May Seek Import Quotas

A COMMITTEE of independent oil producers is considering a proposal which calls for taking oil-import quotas away from refiners and giving them to producers.

The reasoning: Import quotas are subsidies worth $1.15 a barrel. Purpose of the import program is to maintain a sound, healthy domestic industry. If the quotas were given producers, the funds would be used to search for oil, to the economic benefit of the nation.

The idea was developed by a group of Dallas independents. It was presented for them by Gordon Simpson to the import-policy committee of the Independent Petroleum Association of America at the association's midyear meeting.

The IPAA committee felt the proposal too radical for hasty action and approved appointment of a subcommittee to study it. The subcommittee was named late last month by Paul Schultz, president of Blackwell Oil & Gas Co. and chairman of the imports-policy committee.

Chairman of the subcommittee is Lundy O. Allen, president of Sells Petroleum, Tyler, Tex., and vice chairman is E. A. Vaughey, partner in Vaughey & Vaughey, of Jackson, Miss. Members include Gordon Simpson, former IPAA president; Edward S. Martin, Dunn-Mar Oil & Gas Co., Washington, Pa.; W. C. Norman, president of Colorado Oil & Gas Co., Denver; and Edward A. Smith, president of Service Drilling Co., Tulsa.

The proposal of the Dallas independents calls for allocation of crude-oil imports to producers on the basis of each producer's share of total U. S. production over a given period. The producer quotas would be negotiable.

Also to be considered by the committee is a proposal made in May before the Interior Department imports hearing by Joseph M. Rault, Jr., New Orleans independent. It would divide quotas among domestic and foreign producers, with a domestic producer's share based on new reserves discovered and a foreign operator's share based on money spent in friendly foreign nations.

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Indonesia Pushing for New Oil Pacts

• Industry is only nationalized on paper now, but pressure for the real thing is growing. Starry-eyed planners want oil money for new national development program; Sukarno sees political gains in "contractor" system.

This is the second in a three-part series of articles on the oil picture in Indonesia.

Paul Swain
International Editor

THE COMBINED pressures of politics and economics are almost certain to force new oil agreements between the Indonesian Government and private companies—and soon.

Oil is the No. 1 earner of foreign exchange in Indonesia and the country needs hard currency badly. If this isn't compelling enough to force quick agreements to clarify and define the future of oil operations in the country, political motives of President Achmed Sukarno will certainly swing the balance.

Sukarno is unquestionably on top of the complicated and mixed-up political scene in his polyglot and insular empire, but he needs issues to stay there. He is fully expected to declare new nationalizations of Indonesia's private business properties to mark the August 17 anniversary of the country's declaration of independence from the Dutch.

Oil in Indonesia has been nationalized "on paper" since last October. Close observers of the Djakarta political scene believe that Sukarno, as part of his anniversary statement, wants to tell his people that oil is actually nationalized. He can do this only if working agreements with the oil companies have been completed and the companies have been put in the position of contractors for the government.

Economic picture . . . From a negotiating standpoint, the private oil companies operating in Indonesia may be in better shape now than ever before—in spite of the fact that their properties have been nationalized by the government.

President Sukarno
. . . needs issues to stay on top.

Some observers believe Indonesia is in worse shape today economically than at any time since it became independent. Currency in circulation jumped from 40 billion rupiahs in January to more than 71 billion in June — an inflationary spiral that would have long since wrecked a far more stable economy.

The country's foreign-exchange deficit is growing with every passing day. No official figures are available, but the best-informed sources say this deficit hit 3 billion rupiahs in April and topped 5 billion in June. At the official rate of exchange (the only rate available to the oil industry), this amounts to more than $112 million U. S.

Foreign exchange, which the country needs desperately, is a joke. The official rate of exchange is 45 rupiahs to the dollar. The government recently introduced a tourist rate of 90 rupiahs to a dollar, but the going rate at Hong Kong or Singapore—or in the local black market—ranges from 150 to 200 rupiahs per one dollar.

A common ballpoint fountain pen, which costs less than a dollar at Singapore or Hong Kong, sells for $7 or $8 in Indonesia because of this foreign-exchange situation. Oil companies, other businesses, and foreigners employed in Indonesia are held strictly to the ersatz official rate of exchange.

The average Indonesian couldn't care less about the inflated price of a ballpoint pen. All he wants is to be able to buy enough rice, tea, sugar, and other basic staples of diet to sustain life. These commodities are available in limited amounts at strictly government-controlled prices. The "free" market price for all these items is about three times the government price tag.

During this economic chaos, Indonesia has launched an ambitious, far-reaching, and pretty unrealistic "8-year" over-all economic plan for development of the country. The big hitch is that the total cost of this plan will be 240 billion rupiahs and the Indonesian planners concede that at least half of it will have to be in foreign exchange or hard currencies. They confidently expect oil exports to create 71% of that hard currency, or about $1,930,000,000.

This figure is just about four times what the best industry experts say will be available.

The 8-year economic development plan calls for refinery expansion which Indonesia does not need. The country now has about 270,000 bbl. daily in refining capacity, and a domestic demand of about 65,000 bbl. daily. In spite of the fact that Indonesia's traditional customers throughout Southeast Asia are nearly all building refining

capacity, the government is pressing Caltex to build a new refinery in East Java.

Caltex, the biggest crude producer in the country, is the only one of the three private companies which has no refining capacity. The 8% of the domestic market served by Caltex is the smallest segment of the marketing picture. Royal Dutch-Shell has 41% of the market; Standard Vacuum has 31%; and Permindo, a government company, has 20%. None of the three private companies has any desire to expand its marketing in Indonesia because about 96% of the bulk products are sold at a loss under government-controlled prices.

Domestic demand is expected to double within the next 10 years, but the companies can only expect to double their losses.

Kerosine is the biggest single product from a volume standpoint, but it is sold at a government-set price of a little more than 2.5 cents a gallon at Indonesian harbors and retailed to the public at a little more than 4 cents a gallon, compared to a world market wholesale price for the area of about 7 cents a gallon.

The political picture . . . Sukarno is top dog in Indonesia and no really important governmental decisions are made without his support. This lends credence to the widespread belief that he will use his personal power to insure working agreements with the private companies in time for his independence day speeches and proclamations.

Currently, visitors to the country describe the political picture as much improved over a year ago. But it is still confused.

The entire government and Sukarno's hand-picked parliament comprise a group in which four cliques jockey for power. Each is suspicious of the other three. These segments include the Communists, those who regard themselves as "national" Communists, the National Socialists, and the army.

Atop this shaky substructure of government is Sukarno—who is apparently content to let the groups squabble among themselves, impede important government actions and decisions, and vie for power until he feels a dispute has gone far enough. Then he steps in.

UAR Gets 50% of Big Oil Firm

EGYPT by decree is taking over half interest in Anglo Egyptian Oilfields, Ltd., the country's largest refiner and second largest crude producer.

The government will acquire its 50% ownership by adding 40% interest to the 10% it already holds. The company at present is controlled by British Petroleum and Royal Dutch Shell, each with 31% interest. Private stockholders hold the remainder, with 22% of the shares located in Cairo, and 6% in London.

The United Arab Republic will reimburse BP, Shell, and private stockholders for the shares it takes over with 4% government bonds. These will be repayable after 15 years.

Anglo-Egyptian's refinery at Suez is the largest in Egypt. The company also produces about 20,000 bbl. daily from three wholly-controlled oil fields, Ras Gharib, Hurghada, and Gemsa, and three fields held jointly with Mobil Oil. These are Ras Sudr, Asl, and Ras Matarma. Ras Gharib is the best of the fields, averaging better than 16,000 bbl. daily. Gemsa has been shut in for several years.

Proposals for converting the company to a joint UAR stock company have been under consideration since the firms properties were returned in April 1959. These had been sequestered in November 1956 during the Suez crisis. But the actual 50% nationalization of the company is only one of a series of instances in which the government will become an equal partner in 91 firms.

Among the others is Egyptian Independent Oil Co., a local importer and distributer of products, including lubricating oils.

Another refiner, Ste. Egyptienne Pour le Raffinage et le Commerce du Petrole (SERCOP), which operates a 6,200-bbl. plant at Alexandria, will be required to turn over all stock to the government in excess of 10,000 Egyptian pounds or about $28,800. It is one of the 159 firms hit by similar moves.

Aminoil to Raise Neutral Zone Payments

AMERICAN Independent Oil Co. is going over to a 57-43 profit split on its Neutral Zone operations—more nearly in line with the Japanese newcomers to the area.

Under a newly-signed supplement to Aminoil's 1948 concession agreement covering Kuwait's undivided half interest in the Neutral Zone, the company will pay 57% of its net profits to the government starting with this year's operations.

If 57% of the net is less than 50% of the net profits figured on the basis of posted prices, Aminoil will make an additional payment to make up the difference. In practice, this will mean the company will pay 57% of its realization, or 50% of its net based on posted prices, whichever is greater.

Aminoil's new terms are still a little better than those of the Japanese, who pay 50% of the net figured on posted prices.

Aminoil also has agreed to pay Kuwait income taxes on its 1955 to 1960 operations based on a 50-50 profit split under the terms of the government's 1955 income tax law covering Kuwait proper.

The revised agreement subjects Aminoil to an income tax recently extended by Kuwait to cover the mainland and territorial waters of the Neutral Zone. The levy in this area was raised to 57%. The new tax did not automatically apply to Aminoil, however, because the 1948 contract exempted the company from income taxes. A renegotiated agreement was therefore necessary.

Until now, Aminoil paid a royalty of $2.50 per ton (about 35 cents per bbl.) on crude output, along with a special royalty of 7.5 cents per ton on production. Kuwait also held a 15% equity interest in producing and refining operations.

The new agreement abrogates the original contract and eliminates the old royalty payment, along with Kuwait's 15% equity.

On the new basis, Kuwait's share of income will derive from a 12¼% royalty plus taxes.

Libya Reaches for Bigger Share of Oil Profits

• Oil-law revisions will boost the cost of doing business. Present operators must go along with the new rules in order to get additional concessions.

LIBYA has made extensive revisions in its oil law and has added a built-in device to pressure present operators to voluntarily change their concession agreements to conform to the new rules.

The amendments were ordered by royal decree and have been published in Arabic in the Libyan press. They now need only formal publication in the official gazette to become law.

The changes retain the 50-50 profit-sharing principle but sharply raise operating costs and give the government a tighter grip over oil operations. Existing agreements are not affected.

Here are the main changes:

. . . **Depletion allowance** is discontinued. It had already been given up in more recent concession agreements. But this is now law.

. . . **Posted prices,** rather than market prices, will be the basis for figuring an operator's income. This point was not clear under original law.

. . . **Amortization rate** on capital expenditures is reduced.

. . . **Fees and rents** on concessions are greatly increased.

. . . **Acreage surrenders** on smaller concessions must be in one piece, and on larger concessions in no more than two pieces.

A new article provides that no new concessions may be granted to companies already holding concessions unless they agree to revise the earlier agreements in line with the new amendments.

This will put pressure on the successful oil hunters, including Esso and Oasis, to decide whether to renegotiate existing agreements in order to expand their acreage or to forego future concessions and stay with what they have under more favorable terms.

The law offers a carrot, as well as a stick, as a goad to present operators. Agreements in force can be extended automatically for a period equal to the time between the original contract date and the date when the new amendments go into force. This will be done for any concession holder who converts his acreage to the terms of the amended law within 6 months after the changes take effect.

50-50 Split defined . . . The amended law defines the income of a concession holder as the "income equivalent to the posted price per ton for Libyan crude, less the cost of sales discount, multiplied by the number of tons exported."

For the purpose of calculating profits, a concessionaire originally was to be allowed to deduct all expenses and losses, granted an amortization rate of up to 20% per year on capital expenditures incurred before the "effective date" of production, and allowed a depletion allowance equal to 25% of the gross annual income.

A new amendment deletes the depletion allowance entirely. It specifies that physical assets can be depreciated only 10% per year, and all capital expenditures amortized at 5% per year. Operating expenses and overhead costs can be deducted only if spelled out in special regulations.

Fines, foreign income taxes, interest on loans used to finance operations, and expenses incurred in getting oil operations organized and started may not be deducted in figuring profits.

The "effective date" of commercial production, at which time the profit-sharing formula goes into effect, formerly started when exports reached 15,000 bbl. daily. "Effective date" is now the start of regular commercial exports, regardless of the level.

The amended law also puts a new definition on what the government's 50% share of the profits consist of. Included in totaling the country's half interest are fees, rents, royalties, income, and other direct taxes. Indirect taxes and fees, such as municipal taxes, stamp duties, and registration fees in the future will be counted as expenses.

Rents are up . . . An initial fee of $280 per 100 sq. km. (38.6 sq. miles) will be payable on future concession acreage. In the past the initial fee was a flat $1,400 per concession.

Annual surface rentals are raised from $7,000 per concession from the fifteenth to the twentieth year to $9,450 per 100 sq. km., and for the remaining life of the concession, $14,000 per 100 sq. km.

The method of figuring the value of royalty crude also has been revised. This will now be based on the market price f.o.b. the export terminal, with no deduction for handling charges or transportation costs from the field. The Petroleum Commission can take all or part of its 12% royalty either in cash or kind.

Surrender areas . . . Companies de-

New Libyan Oi

THE ownership structure of the aborning National Oil Co. of Libya was disclosed last week.

Libyans will own 51% of the new company and a group of foreign independent oil operators and cooperatives will hold the remaining interest.

This represents a sharp departure from conventional methods of entering a country for oil exploration and it may have profound effects upon the manner in which future new ventures take shape both in Libya and other countries (OGJ, July 17 p. 41).

The unique ownership plan was detailed by Fred Sharp, president of Libyan Desert Oil Co., a subsidiary of Texfel Petroleum Corp. His company holds a minor interest in National Oil of Libya.

Sharp says a group of as-yet unnamed Libyan businessmen will hold 14.79% of the total capital stock. They are serving as local founders and organizers of the company. Filling out the controlling Libyan interest, 36.21% of the total capital stock will be offered on th

ciding on which parts of their concessions to give up when surrenders fall due must now give up the relinquished area in one block on concessions less than 12,000 sq. km. (4,630 sq. miles). Surrenders on larger concessions may be made in two sections, if the commission has no special objection.

The commission in the future will award concessions after inviting sealed bids that will list all the terms companies are prepared to offer over and above those stipulated by the amended law.

While companies have recently offered better terms than the old law, applicants originally were not expected or required to improve on the provisions.

The commission has been given authority to approve the use of spare pipeline capacity to carry crude produced by other operators. The original law stated only that surplus capacity be made available on terms comparable with those prevailing in the industry.

Venezuela Likes Creole Plan

CREOLE Petroleum Corp. seems to have interpreted accurately the rising tide of nationalism in Venezuela.

Creole's formation of a $10 million investment company to help Venezuelan business perk up the nation's economy has brought an enthusiastic response from throughout the country.

Creole's plan is to invest money in ventures other than oil, with Creole holding only a minority interest in otherwise strictly Venezuelan projects.

In announcing the plan last month, President Harry Jarvis said there would be five main requirements for any investment:

The project must be deemed necessary for the country, must make use of Venezuelan raw materials, must employ Venezuelans, must have a reasonable chance of financial success, and must either have or create foreign exchange for the country.

BP Gets First Libyan Find

BRITISH Petroleum has its first taste of oil in Libya.

The company's CL wildcat in Block 34 in Northwest Tripolitania may not be commercial. But it marks the initial find of the only one of the original group of entrants to the country which had not found oil.

The CL tested 160 bbl. daily of clean 37.5°-gravity oil from 7,620 ft. The company expects the well to be good for only about 40 bbl. daily on production over a long period.

The block lies to the north and east of Shell's concession 70, where the Tlacsin find is located, and CPTL's concession 23, where a 1,932-bbl. daily find was made.

Firm's Makeup May Affect Future Ventures

market to Libyan citizens only at a par value of 2 Libyan pounds ($5.60) a share.

Sharp emphatically denies that either Dr. Anis Qasem, former chairman of the Libyan Petroleum Commission, or Dr. Nadim Pachachi, advisor to the commission, have any interest or other participation in the new company. They are not, he says, among the Libyan stock-owning group of businessmen.

Qasem has served only, Sharp says, as a legal advisor to the new company, as he is doing with several other oil companies operating in Libya.

Foreign holdings detailed . . . The 49% interest held by non-Libyans in National Oil of Libya, the Libyan Desert executive says, is split up as follows:

. . . The big Swedish cooperative, Sveriges Oljekonsumenters Riksforbund, OK, would hold the largest single hunk of stock—19%.

. . . Cracca Libya, Inc., a subsidiary of Consumers Cooperative Association, Kansas City—10.125%.

. . . Kewanee Overseas Oil Co., subsidiary of Kewanee Oil Co., Tulsa—10.125%.

. . . A cooperative group, International Cooperative Petroleum Association, holds 6.75%. ICPA includes the Central Bureau of Rotterdam, National Cooperative Refinery Association, McPherson, Kans., and others. Also in the group is Texas City Refining, Inc.

. . . Libyan Desert Oil Co., subsidiary of Texfel Petroleum, 3%.

Integration possible . . . National Oil of Libya, Sharp says, plans to acquire concessions and explore for and develop oil and gas—but it may not stop there.

The stockholders are considering plans to erect and operate a refinery within the country and to establish retail marketing facilities there.

The company, the Texfel executive says, will develop its own operating force.

And, as a Libyan corporation, it expects to "undertake public financing of its various enterprises inside as well as outside Libya."

Profit to stay in Libya . . . The stock offering to the Libyan public, Sharp says, will be made in the near future, probably in the next couple of months.

Though largely Libyan owned, National Oil of Libya will operate as a conventional oil company.

Nevertheless, he says, the new ownership conception will make the company "an extremely important factor in the Libyan economy.

"By the nature of its composition as well as the provisions of the Libyan petroleum law, the new national company will leave more than 75% of its profits from operations in the country of origin."

Sharp also spikes reports that the non-Libyan interests would furnish all or the great bulk of company operating capital. "Libyan and non-Libyan founders are providing the initial capital requirements of the ccompany on a basis directly proportionate to their percentage stock holdings in the company," he says.

World Output Declines

- **U. S. reduction offsets increases in Venezuela and Canada. Middle East production is down again.**

FOREIGN production picked up in May, but the gain was more than offset by a decline of 181,300 bbl. daily in the U. S.

Canada and Venezuela, for a change, accounted for most of the rise in foreign production, with gains that made up for a general decline in the Middle East of 63,800 bbl. daily.

Exceptions to the general slackening in the Persian Gulf area, however, were Iran, where output reached a record 1,279,000 bbl. daily, and the Neutral Zone, where output inched upward to another high at 158,600 bbl. daily.

Relatively new Nigerian production rose to a record 37,000 bbl. daily for the first time, a mark which is likely to be surpassed in the face of the extensive development program in progress in the country.

TREND OVER THE LAST YEAR
(Thousands of barrels)

	Western Hemisphere less U.S.	Middle East	Total free world outside U. S.
1960			
May	4,302.7	5,280.5	10,637.1
June	4,285.4	5,164.5	10,568.2
July	4,214.2	5,103.5	10,448.2
August	4,420.1	5,146.8	10,620.5
September	4,311.3	5,500.2	10,941.3
October	4,243.9	5,630.6	11,104.5
November	4,206.8	5,482.2	10,964.2
December	4,341.2	5,550.1	11,152.2
1961			
January	4,594.1	5,568.1	11,418.8
February	4,616.9	5,697.7	11,572.8
March	4,448.6	5,764.1	11,510.1
April	4,287.9	5,558.7	11,151.7
May	4,381.3	5,494.9	11,231.5

World-Wide Crude Production: Daily Average in Thousands of Barrels

Country—	May 1961	Apr. 1961	May 1960
Western Hemisphere			
Argentina	225.0	223.3	161.1
Bolivia	7.8	7.4	9.2
Brazil	92.0	92.0	71.2
Canada	616.0	570.0	538.1
Chile	22.3	22.1	19.1
Colombia	146.4	145.9	156.3
Cuba	0.2	0.2	0.2
Ecuador	8.3	8.3	7.4
Mexico	286.1	286.1	263.8
Peru	52.2	52.2	50.9
Trinidad	124.8	124.8	120.3
Venezuela	2,800.2	2,755.6	2,905.1
Total	4,381.3	4,287.9	4,302.7
Europe			
Austria	44.7	44.7	46.9
France	41.0	40.7	38.9
West Germany	117.0	117.0	108.5
Italy	37.4	37.4	34.1
Netherlands	38.9	39.3	34.6
United Kingdom	1.7	1.7	1.8
Yugoslavia	29.4	27.7	17.1
Total	310.1	308.5	281.9
Middle East			
Bahrain	45.0	45.0	45.1
Iran*	1,279.0	1,051.0	977.0
Iraq†	913.8	975.0	958.6
Israel	2.3	2.3	2.5
Kuwait	1,566.3	1,738.3	1,787.6
Neutral Zone	158.6	153.4	131.5
Qatar	180.0	174.3	148.2
Saudi Arabia	1,342.9	1,412.4	1,223.1
Turkey	7.0	7.0	6.9
Total	5,494.9	5,558.7	5,280.5

Country—	May 1961	Apr. 1961	May 1960
Other Asia			
British Borneo	90.0	90.0	94.5
Burma	10.5	10.5	9.8
India	8.5	8.5	8.5
Indonesia	429.4	321.2	408.5
Japan	11.9	12.1	9.3
New Guinea	3.3	3.3	4.4
Pakistan	5.9	5.9	5.9
Total	559.5	551.5	540.9
Africa			
Algeria	356.7	327.5	132.4
Angola	1.5	1.5	1.6
Egypt	71.7	71.7	64.0
Middle Congo	1.8	2.1	.....
Gabon	15.3	15.0	15.0
Morocco	1.7	1.7	1.9
Nigeria	37.0	25.6	16.2
Total	485.7	445.1	231.1
Free World			
Foreign	11,231.5	11,151.7	10,637.1
United States	7,146.9	7,328.2	6,848.3
Total	18,378.4	18,479.9	17,485.4
Communist Countries in Soviet Orbit			
Romania	234.0	234.0	234.0
Russia	3,220.0	3,220.0	2,850.0
Other Communist	100.0	100.0	100.0
Total	3,554.0	3,554.0	3,184.0
WORLD TOTAL	**21,932.4**	**22,033.9**	**20,669.4**

Figures are from reliable industry reports or government sources. Estimates are made where complete reports are lacking. *Includes estimated 6,000 bbl. daily from Naft-i-shah field not operated by consortium companies. †Includes production from Naft Khaneh field, operated by Iraq Government.

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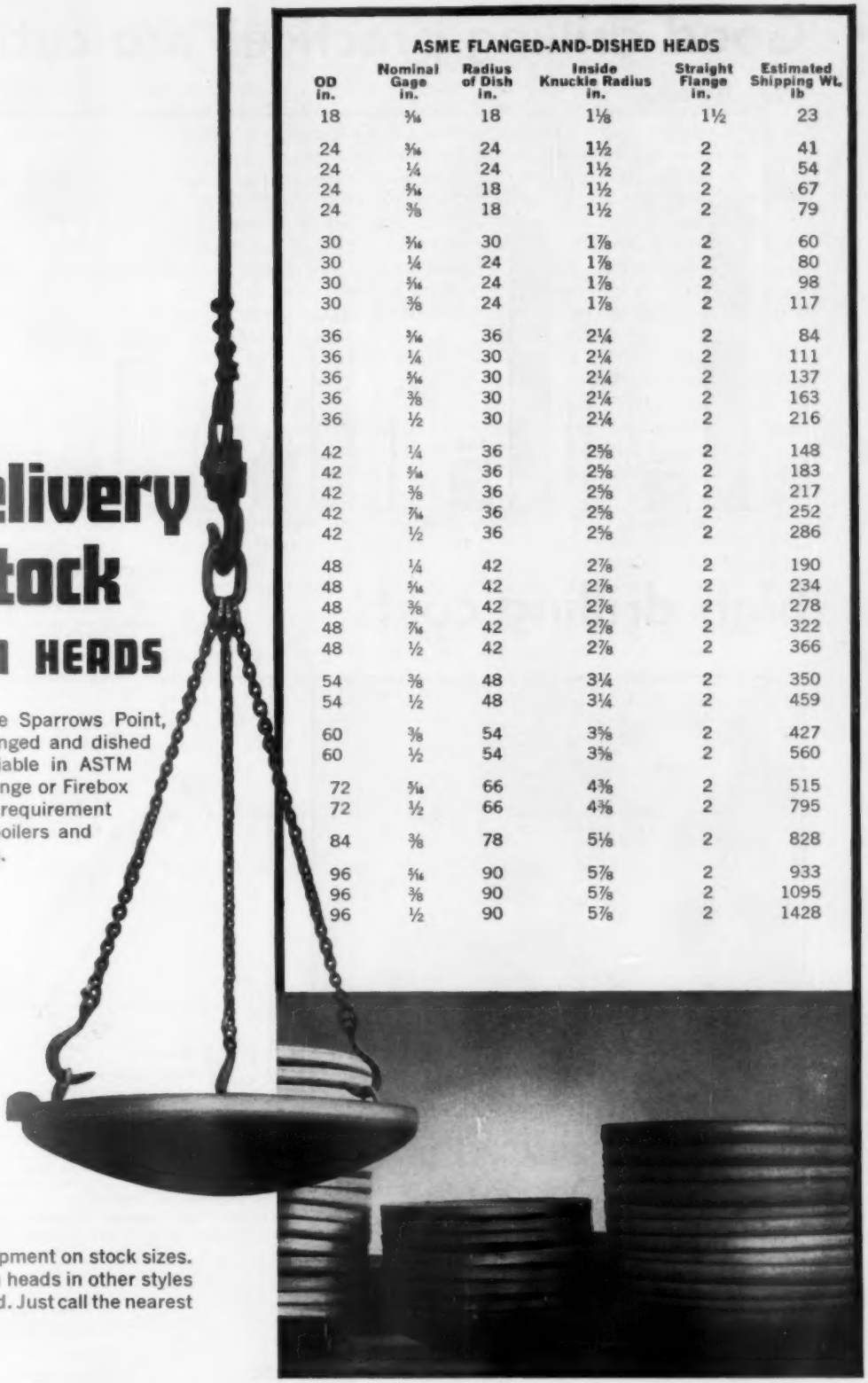
ASME FLANGED-AND-DISHED HEADS

OD in.	Nominal Gage in.	Radius of Dish in.	Inside Knuckle Radius in.	Straight Flange in.	Estimated Shipping Wt. lb
18	3/16	18	1 1/8	1 1/2	23
24	3/16	24	1 1/2	2	41
24	1/4	24	1 1/2	2	54
24	5/16	18	1 1/2	2	67
24	3/8	18	1 1/2	2	79
30	3/16	30	1 7/8	2	60
30	1/4	24	1 7/8	2	80
30	5/16	24	1 7/8	2	98
30	3/8	24	1 7/8	2	117
36	3/16	36	2 1/4	2	84
36	1/4	30	2 1/4	2	111
36	5/16	30	2 1/4	2	137
36	3/8	30	2 1/4	2	163
36	1/2	30	2 1/4	2	216
42	1/4	36	2 5/8	2	148
42	5/16	36	2 5/8	2	183
42	3/8	36	2 5/8	2	217
42	7/16	36	2 5/8	2	252
42	1/2	36	2 5/8	2	286
48	1/4	42	2 7/8	2	190
48	5/16	42	2 7/8	2	234
48	3/8	42	2 7/8	2	278
48	7/16	42	2 7/8	2	322
48	1/2	42	2 7/8	2	366
54	3/8	48	3 1/4	2	350
54	1/2	48	3 1/4	2	459
60	3/8	54	3 3/8	2	427
60	1/2	54	3 3/8	2	560
72	5/16	66	4 3/8	2	515
72	1/2	66	4 3/8	2	795
84	3/8	78	5 1/8	2	828
96	5/16	90	5 7/8	2	933
96	3/8	90	5 7/8	2	1095
96	1/2	90	5 7/8	2	1428



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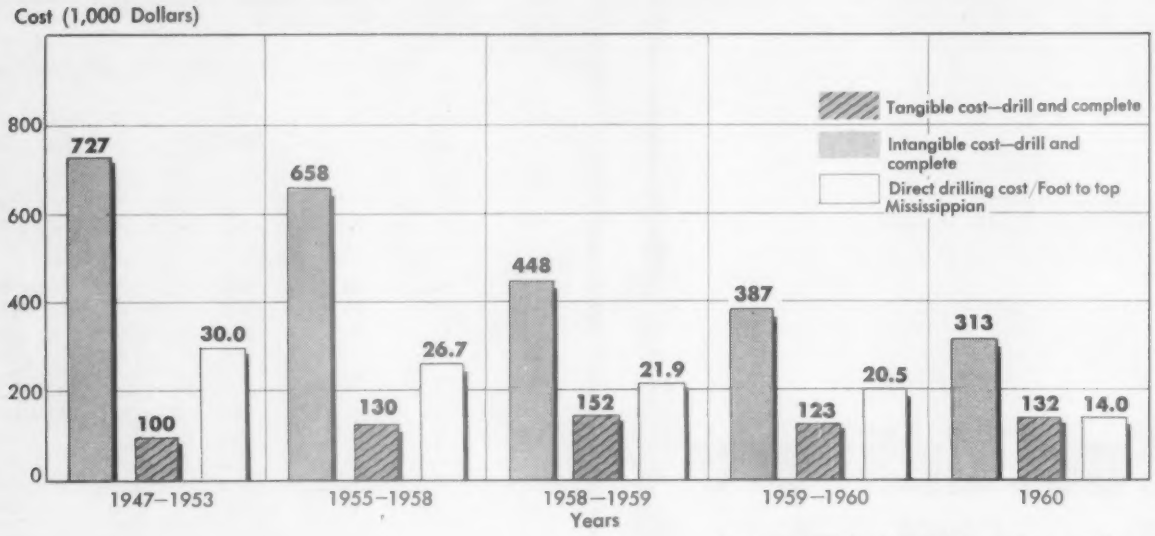
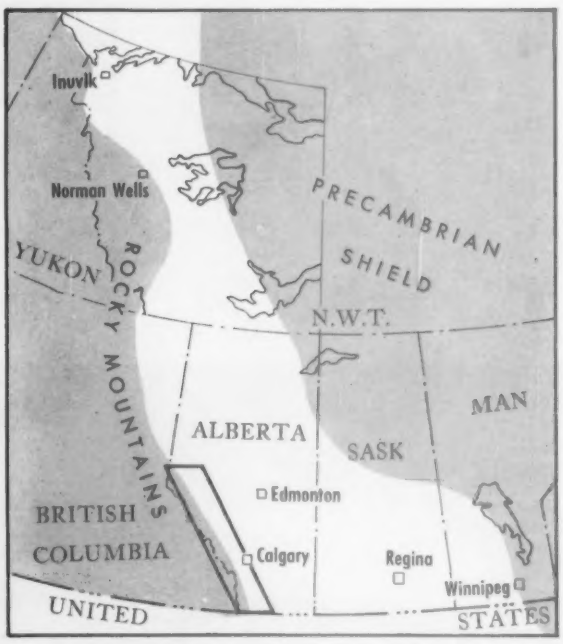
Good drilling practices are cutting



DIRECT DRILLING COSTS have been steadily reduced in the 14-year history of Pincher Creek field. Tangible costs have varied as casing and tubing sizes have changed.

high drilling costs



FOOTHILLS BELT, shaded area above, is characterized by steeply dipping beds, numerous faults, and hard rocks. Index map at left shows location of the Foothills belt in relation to western Canada's principal geologic features. Unshaded area is the western plains.

in Alberta foothills

New tools and techniques show promise

BY J. J. SULLIVAN
British American Oil Co., Ltd.,
Calgary, Alta.

THE ABNORMALLY HIGH drilling costs in the Foothills belt of western Canada are being successfully reduced by better drilling techniques.

Here are some of the most important changes:

1. Packed-hole drilling. Use of

11¼-in. drill collars in 12¼-in. hole has kept hole straighter and speeded penetration.

2. Relaxed deviation limits. Closer control is placed on the rate of change of hole angle instead of the angle itself. Result is faster drilling through crooked-hole sections since more weight can be carried on bit.

3. Low-weight, low-solids muds. These fluids have speeded drilling in the medium-hard sand and shale in the Pincher Creek area.

4. Air and gas drilling. Although not usable everywhere, air and gas drilling have cut drilling time in some places.

There are several causes of the high drilling costs: steeply dipping beds, caving shales, and hard formations. All are found in various degrees throughout the Foothills, but of these, crooked hole is the greatest problem and adds more to drilling cost. Cause of the crooked hole is the steeply dipping beds associated with complex folds and numerous faults in the shallower sediments from surface down to 8,000 ft.

In Pincher Creek. British American Oil Co.'s Foothills drilling experience has been concentrated in Pincher Creek field. Drilling program in the area has been fairly continuous for the past 14 years.

The western Canada sedimentary basin is bounded on the east by the Precambrian shield and on the west by the Rocky Mountains. The Foothills belt is a relatively narrow area of disturbed strata lying between the Paleozoic mountains on the west and the relatively little disturbed interior plains on the east. The Canadian Foothills extend from the Alberta-Montana border northwest to the Arctic Sea. General trend of all structures in the Disturbed belt is north-northwest. There are many low and high-angle western dipping faults.

The Foothills belt of Alberta is 10 to 40 miles wide and about 500 miles long. It comprises about 15,000 sq. miles. Westerly limit of the Foothills is a series of regional low-to-high-angle major thrust faults which form the front ranges of the Rocky Mountains. Eastern limit is the most easterly of the major thrust faults.

In the outer Foothills area, there are steeply dipping contorted shales and sandstones, with as many as six repetitions of some parts of the Cretaceous section. This situation causes the major problems in Foothills drilling.

The formations. The stratigraphic column in Pincher Creek contains unconsolidated tills, sands, and gravels which overlie the Mesozoic sediments. These sediments consist mainly of noncompetent sandstone and shale which are broadly divided into the following formations:

- The Belly River is mainly shale at the top, grading to carbonaceous shales, coal seams, and sandstone at the base.
- The Alberta group or Colorado underlies the Belly River and consists of an upper shale 750 ft. thick and a lower shale 350 ft. thick; these are separated by a locally clean sandstone, the Cardium, about 100 ft. thick. The Alberta sequence may be repeated five or six times in the Foothills.
- The Lower Cretaceous Blairmore group is about 1,800 ft. thick and consists of shales, interbedded with thin, massive sandstone. There is a chert pebble conglomerate and coarse sandstone sequence at the base. The Blairmore group may be repeated up to four times in the Foothills.
- The Kootenay formation is about 50 ft. thick and consists of coal seams 10 to 20 ft. thick overlying soft bentonite shale and basal fine siliceous sandstone.
- The Fernie formation is predominantly shale about 550 ft.

TABLE 1—MAJOR DRILLING PROCEDURE CHANGES, PINCHER CREEK FIELD, 1947-1960

Deviation limits	1947-1953	1955-1958	1958-1959	1959-1960	1960
Surface hole	1° max.	1° max.	1° max.	1° max.	1° max.
Below surface hole	3° max.	1° per 1,000 ft. of depth	3° at 2,000 ft. 5° at 5,000 ft. 1° per 1,000 ft. thereafter	3° at 2,000 ft. 5° at 3,000 ft. 1° per 1,000 ft. thereafter	3° at 2,000 ft. 5° at 3,000 ft. 1° per 1,000 ft. thereafter
Deviation rate of change	.....	1° per 100 ft.	2° per 100 ft.	2° per 100 ft.	2° per 100 ft.
Hole size (in.)					
Surface	17½	17½	17½	17½	17½
Surface, 6,000 ft.	9	12¼	12¼	9	9
6,000 to 12,000 ft.	9-8⅝	8⅝	8⅝	9	9
Drill-collar size (in.)					
Surface hole	6¾	11¼	11¼	11¼	11¼
Surface, 6,000 ft.	6¾	11¼	11¼	6¾	6¾
6,000 to 12,000 ft.	6¾	6¾	6¾	6¾	6¾
Casing					
Surface	13⅜	13⅜	13⅜	13⅜	13⅜
Intermediate	7-9⅝	9⅝	9⅝	.....	.....
Production	5-7	7	7	7	7
Drilling fluid					
Type	Mud Water-gel Oil-emulsion	Mud Lime-oil-emulsion	Mud Low-solids Lime-oil-emulsion	Mud Low-solids Lime-oil-emulsion	Gas and mud Lime-oil-emulsion

thick. Thin beds of quartzitic sandstone are developed near the top and the base of the shale sequence. The Fernie is equivalent to the Ellis formation of Montana.

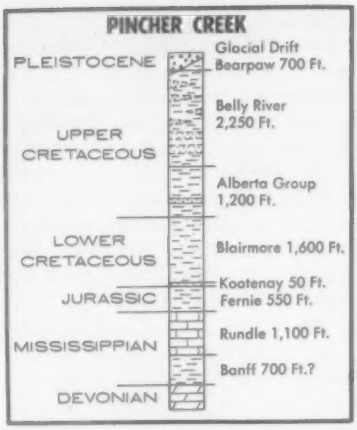
• The Rundle formation consists of dolomites and limestone. The thickness in the Pincher Creek area is probably 1,100 ft. although the Rundle has not been fully penetrated. The Rundle is the main producing reservoir in the Pincher Creek-Waterton area.

Pincher Creek wells have drilled as many as 10 faults in the Mesozoic beds.

Drilling Activity

Drilling in the Alberta Foothills has risen from only 24,000 ft. in 1947 to 208,000 ft. in 1957 and 382,000 ft. in 1960. The increase since 1957 results from the market outlet for gas brought by the Trans-Canada Pipe Line and by exports to the United States.

During the past 14 years, British American Oil Co. drilled 31 wells in the Alberta Foothills to an average depth of 12,455 ft. per well. Of these, 23 were in the Pincher Creek area, 18 of which were in Pincher Creek field itself. Of the 18 Pincher Creek wells 12 are connected for production, 4 are suspended, 1 is abandoned, and 1 is in service as a water-disposal well. Development of the field will be completed in 1962 with the drilling of six additional locations. There are currently two rigs in the field completing this final stage of the program.



PROBLEM FORMATIONS ALL are these zones in the general stratigraphic column under Pincher Creek field. In some wells the same zone is drilled six times.

Changing practices. For our discussion the Pincher Creek wells have been divided into five groups according to the drilling practices used: 1947-1953, 7 wells; 1955-1959, 6 wells; 1958-1959, 2 wells; 1959-1960, 3 wells; 1960, 1 well.

Only break in development of Pincher Creek was in 1954 when no wells were drilled. Table 1 outlines drilling practice in each period.

Crooked hole. During early development of Pincher Creek (1947 to 1953) deviation was restricted to a 3° maximum in the hope of avoiding hole trouble. Little attention was paid to rate of change of deviation so long as the hole remained within 3°. Consequently, in this period dog-legs and keyseats were frequent problems.

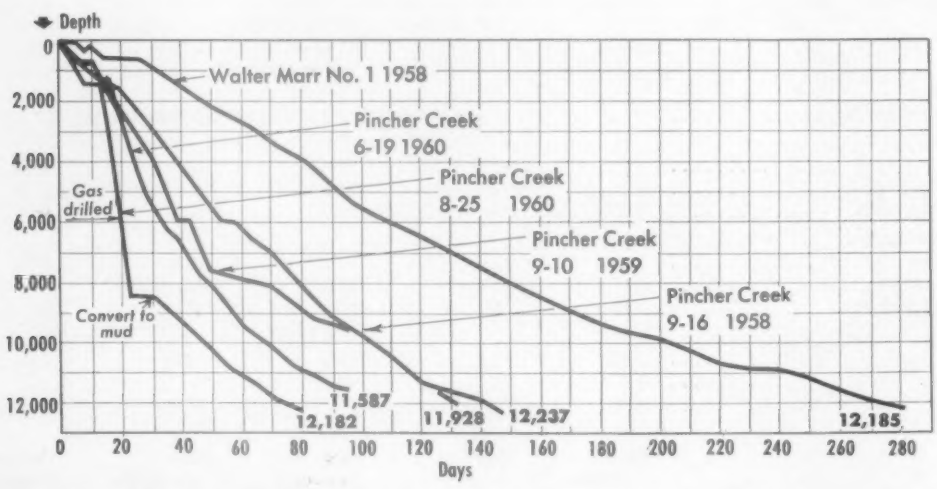
In the top crooked-hole sections of the wells, very low bit weights were run to remain within the deviation limits. Not only was drilling slow, but in some cases there was severe hole trouble as a result of the long exposure of the shale sections to the mud.

To speed drilling rates in the top 6,000 ft. of hole, deviation limits were relaxed in 1955. New limits were 1° per 1,000 ft. of depth with a maximum rate of change of 1° per 100 ft. Although there was some improvement, drilling in the top 6,000 ft. of hole was still hampered by the low bit weights necessary to stay within deviation limits.

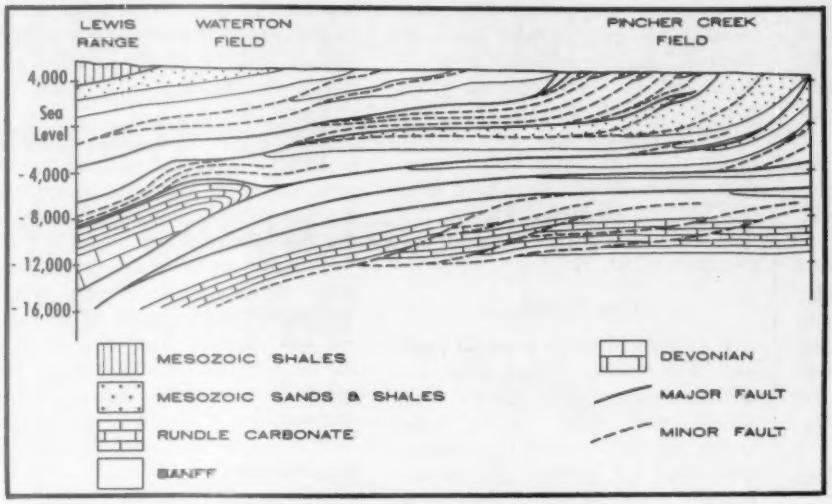
In 1958 deviation limits were further relaxed. Deviation limits were: 1° at the surface casing shoe, 3° at 2,000 ft., 5° at 3,000 ft. and 1° per 1,000 ft. thereafter, with a maximum change of 2° per 100 ft. After this, drilling rates improved through the top 6,000 ft. of crooked-hole section.

During early development of the field, average horizontal hole displacement at 12,000 ft. was 295 ft. Since deviation limits were relaxed, hole displacements now vary from 600 to 900 ft. In some instances surface location is offset to allow for this displacement.

Packed-hole drilling. From 1947 to 1953, the primary means keeping the hole straight was weight control. In 1955, the company began using 11¼-in. collars in the 12¼-in. hole. This measure proved very successful and packed-hole drilling became standard for drill-



STEADY REDUCTION IN DRILLING TIME to the top of the Mississippian is result of improving drilling practices at Pincher Creek. Best well to date drilled long shallow section with gas.



GEOLOGICAL CROSS-SECTION of Pincher Creek area.

ing the top 6,000 to 7,000 ft. of hole. Because the large collars permit higher bit weight without exceeding deviation limits, drilling was faster.

By 1959, drilling time to the top of the Mississippian had been reduced below 100 days compared to 200 days in 1947 to 1953. With the faster drilling, the old trouble from sloughing shales practically disappeared. Dog-legs and keyseats were no longer a problem. As a result, the 6,000 ft. of 9⅝-in. intermediate casing was no longer needed. So the string was eliminated and hole size reduced to 9 in. from under surface casing. Drill-collar size was reduced to 6¾ in. There was little change in drilling rates or hole deviation.

Drilling fluids. The first four wells in Pincher Creek field were drilled with water-base muds. In these holes, either mechanical effects or shale hydration and sloughing caused bad hole enlargement. As a result, the mud was changed to an oil-emulsion system. This improved drilling but did not eliminate caving.

In 1955 light lime oil-emulsion muds were used for the first time in the field. This mud improved hole conditions and is still commonly used in Foothills drilling.

In 1958, tests with a low-weight, low-solids mud speeded drilling in the upper hole. As a result, this has become standard in the top 6,000 to 9,000 ft. of hole. Then, the low-weight, low-solids muds are converted to a lime oil-emulsion at this depth.

Most radical change in the circulating medium was in 1960 when gas was used to drill from 1,444 ft. to 8,501 ft. at 8-25 Pincher Creek. Results were very good with drilling rates 2.6 times faster than the best mud-drilled hole.

Results good. The above changes in procedure, coupled with improved equipment, have been quite successful in reducing drilling time and costs in Pincher Creek. In 1948, the 1 Walter Marr required 282 days to drill 12,185 ft. of hole. In 1960, 8-25 Pincher Creek drilled to 12,182 ft. in 80 days.

Rotating hours on bottom to drill from surface to the Mississippian have also been reduced. Average in 1947 to 1953 was 2,472 hours. It was 1,126 hours in 1959 to 1960. Rotating hours were cut to 950 hours in 1960 at 8-25 Pincher Creek, when gas was used to drill from 1,444 ft. to 8,501 ft. Penetration rates were 4.7 ft. per hour during 1947-1953 compared to 12.8 ft. per hour in 1960.

As drilling time has shortened, there has been a corresponding reduction in number of bits. An average of 219 bits per well was used in 1947 to 1953. Only 81 bits were needed in 1960. Average footage per bit increased from 53.5 ft. to 150 ft. Average hours run per bit was fairly constant over the 14-year period.

From surface to 6,000 ft., average bit weight increased with each change in drilling procedure, except on the gas-drilled hole. The low weight on the gas-drilled hole is expected, since low weight results in high penetration rates and helps prevent hole deviation.

Weight per inch of bit diameter also increased in the lower hole from 6,000 ft. to the top of the Mississippian, except during the last two periods resulted from worse than usual crooked-hole problems from 6,000 to 9,000 ft.

Air, Gas Drilling

Air and gas drilling look promising in the Foothills. To date, British American has used air or gas on three locations in the area. Initial test was at BA et al. 5-7 Kaydee, a wildcat in the Central Alberta Foothills about 300 miles northwest of Pincher Creek. Second test was at 8-25 Pincher Creek using fuel gas from the Pincher Creek gas plant. Third test was at 4-13 Lookout Butte, a wildcat south of the field.

Air drill, 5-7 Kaydee. It was decided to use air at 5-7 Kaydee after the original wildcat well, 14-12 Kaydee, a proposed 14,500-ft. test, could not be completed. The 14-12 Kaydee was suspended 224 days after spud at a total depth of 10,031 ft.; sloughing in the Blackstone shale had become uncontrollable.

At 5-7 Kaydee, 13⅜-in. surface casing was set at 3,720 ft. and the plug drilled with a 12¼-in. bit using air. Under the surface casing shoe, a flow of 10 to 12 bbl. per day of water was found. Air drilling continued with some difficulty to 3,805 ft. where a water shutoff was attempted. An inflatable packer was set in the float collar and 400 lb. of silicon tetrafluoride squeezed into the 85-ft. open-hole section at a maximum pressure of 2,100 psig. The water was shut off successfully.

The 12¼-in. hole then air drilled to 8,774 ft. A small amount of water at about 6,576 ft. caused only minor problems; after each trip, it took a short time to dry the hole. The drying problem was solved by injecting a fine diatomaceous earth after tripping. However, hole conditions deteriorated. Finally, hole enlargement in the Blackstone shale increased air-volume requirements beyond economic limits.

A string of 9⅝-in. intermediate casing was run in the dry hole to 8,774 ft. and the hole circulated with air. Then the hole was filled with mud. The casing was cemented without difficulty.

Air drilling continued below the intermediate casing to 9,712 ft., where conditions go so bad the hole was converted to mud.

The 5,988-ft. air-drilled interval took only 599 rotating hours. The same interval on the original hole took 1,023. Number of bits dropped from 3 to 14. The success in this well makes air drilling attractive for holes with similar severe sloughing in long shale sections.

Gas drill, Pincher Creek. The 8-25 Pincher Creek was gas-drilled using sweet gas from the Pincher Creek. Results were very encouraging. A string of 13⅜-in. surface casing was set at 1,444 ft. and gas drilling commenced from under the casing shoe. A 9-in. hole was drilled from 1,444 ft. to 8,501 ft. in 10 days with an average penetration rate of 706 ft. per day. Approximately 3 to 4 M.M.c.f.d. of gas was used.

The fastest mud-drilled hole in Pincher Creek field had been the 10-24 well; a similar 7,057-ft. interval was drilled in 29 days at an average of 244 ft. per day. The gas-drilled section at 8-25 Pincher Creek saved 228 rotating hours or 19 days' rig time. This amounts to a 70% saving in cost to drill the 7,057-ft. interval or a 15% reduction in the total cost of mud-drilled holes.

Average penetration rate over the 7,057-ft. interval was 55 ft. per hour, 34 ft. per hour faster than the fastest conventional hole. The nine air bits required to drill the 7,057-ft. section averaged 785 ft. per bit. Conventional wells require an average of 36 bits to drill a similar section, averaging 195 ft. per bit. The 1,642 ft. drilled by one air bit is about four times the maximum bit footage on mud-drilled holes.

Air drill, Lookout Butte. At 4-13 Lookout Butte, air was used to drill from under the surface casing at 1,620 ft. to 4,167 ft. Drilling was slowed at this well by hard formations, crooked hole, and a small gas blow at 1,900 ft. Air drilling was ended at 4,167 ft. by a heavy oil seep which prevented removal of cuttings from the hole. Because the formations were so hard and the crooked-hole problem so bad, bit weights were kept low and drilling was only slightly faster than offsetting wells. However, six fewer bits were used over the 2,547-ft. air-drilled interval. All in all, it was a fairly successful application of air drilling.

Cost Trends

It is hard to make a sound analysis of Foothills drilling costs because geology changes greatly from well to well. High dipping beds, faulted sections, sloughing shales, and hard-rock drilling are general in most wells. However, these conditions are more severe in some areas than others. In some instances, conditions vary greatly within an area of close-spaced wells. And, distance between wildcat locations may be 20 to 30 miles.

Comparing total well costs does not give a true picture of actual drilling costs. Access roads and location in some areas may cost $100,000; or they may cost 5 to 20% of the total. More coring and testing are done on some wildcats than others. So, to put costs on a standard level for comparison, the best basis is direct drilling costs. Direct drilling costs are mud, fuel, bits, water, fishing, rig move, and contractor costs while actually drilling.

British American drilled 13 wildcats and participated in 4 others from 1947 to 1960. Of these, five were in the vicinity of Pincher Creek field; the remainder can be considered remote locations. Direct drilling costs varied from $24 to $52 per foot, the lower cost being in Pincher Creek area. No doubt the company's experience in Pincher Creek field helped lower wildcat costs in that area.

Drilling-cost trends in the Alberta Foothills can be illustrated by Pincher Creek field's drilling from 1947 to 1960. During the 14-year period, 19 wells were drilled, 2 wildcats and 17 development wells.

Average direct drilling cost for 1947 to 1953 was $30 per foot to drill 11,994 ft. of hole to the top of the productive Mississippian. In the 1959-1960 period direct drilling costs had been reduced to $20.45 per foot. The first gas-drilled well in Pincher Creek in 1960 reduced the direct drilling costs to $14 per foot.

Progress has been made not only in drilling costs but in completion costs as well; the total intangible costs have been reduced 57% since the 1947-1953 period.

Tangible costs have varied because of changes in tabular goods and wellhead equipment. When tubing was changed from 2⅞ to 3½ in. in 1955, the result was an increase in cost. In 1959, the 9⅝-in. intermediate casing was eliminated with a corresponding reduction in tangible costs.

New tools. There are several new tools and techniques which show promise for Foothills drilling. For instance, there is a new deviation instrument used in conventional mud-drilling holes which requires only 3 to 4 minutes to take a survey; with the tool, deviation and rate of change of reviation can be better controlled by taking the surveys at close interval and adjusting bit weights as required. There is a big time saving since conventional deviation surveys take 30 to 40 minutes each on a 12,000-ft. Foothills well.

The air-hammer drill has been tested in Foothills wells. Although this is useful only in air or gas drilling, drilling rates with it have been more than twice those with conventional air drilling. Moreover, the tests indicate that the faster drilling is possible with less crooked hole.

Full-hole, spiral-grooved drill collars are being tested as a means of improving deviation and speeding penetration through crooked-hole sections. The large collars have an outside diameter of 12⅛ in., and are used in a 12¼-in. hole. Reports to date have been promising.

Better use of jet bits and the available rig-pump horsepower should help cut costs. With good hydraulics, jet bits, and low-weight, low-solids muds, penetration rates should be higher particularly in the soft to medium-hard formations in the top 6,000 to 9,000 ft. of hole in most Foothills areas.

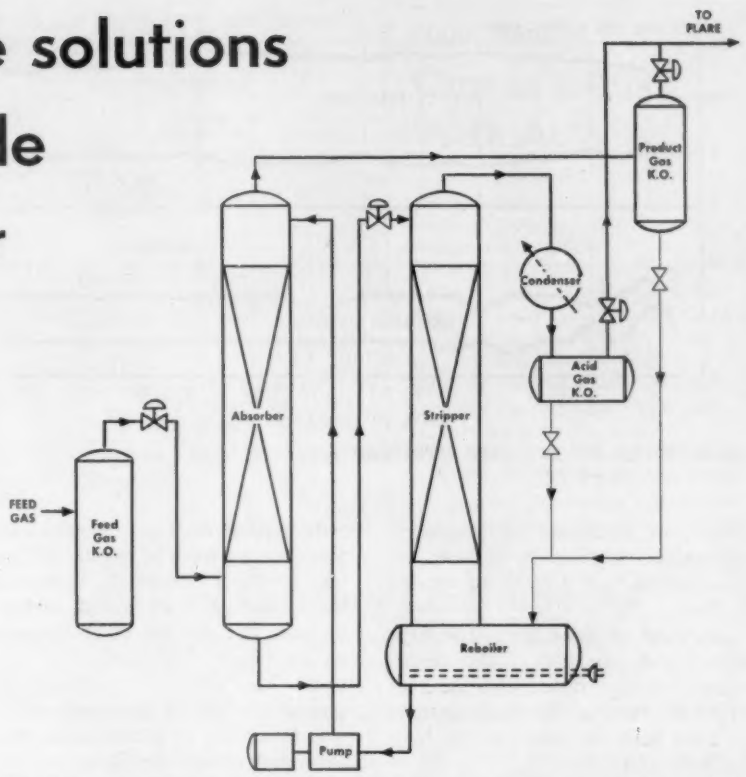
This paper originally presented under title, "Drilling-Cost Trends in the Alberta Foothills," at 1961 spring meeting of API Division of Production's Rocky Mountain district meeting, Casper.

Hot carbonate solutions do not degrade when used for H_2S removal

Even after prolonged use with a high ratio of CO_2 and H_2S in the feed, solution will not deteriorate. High absorption efficiency and capacity were maintained through a 25-day run.

BY R. N. TENNYSON

. . . process engineer for Fluor Corp., Ltd. Prior to joining Fluor in 1957, he worked as a process engineer with Allied Chemical Corp. for 5 years. He also worked as a research engineer for B. F. Goodrich between 1950 and 1952. Tennyson received a BSChE degree from University of Minnesota.



PILOT-UNIT RESULTS show that the hot-carbonate process is a reliable, stable system. Fig. 1.

A CONTINUOUS field pilot-plant operation of 25 days' duration was recently completed by Fluor Corp. in which the hot potassium carbonate (Benfield) process was used to reduce the acid gas content of a feed stream from 13.4% H_2S and 4.6% CO_2 to 0.03% H_2S and 0.07% CO_2. The test firmly established that hot carbonate solution used for treating a gas containing a substantial quantity of H_2S as well as CO_2 is stable.

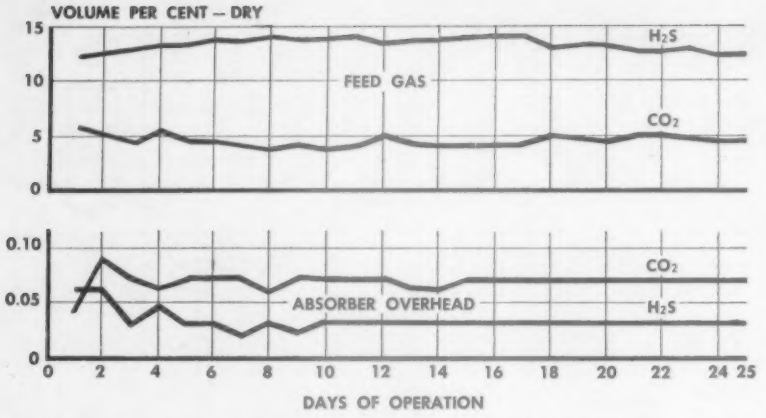
Background. Although the hot carbonate process has been known for many years, its commercial realization is a relatively new development. The process was first used solely for the removal of CO_2 from gas streams essentially free of H_2S, and several commercial plants have been built for this purpose and are operating satisfactorily.

The hot carbonate process for H_2S removal has only recently reached the stage of commercial application. Two plants have been built. The first, installed by Lone Star Producing Co. at Fashing, Tex.,[3] has been in operation about 3 years, successfully treating a feed gas stream containing about 9.4% total acid gas including a substantial amount of H_2S and a much greater quantity of CO_2. The plant uses the hot carbonate process to remove most of the acid gas, followed by an amine plant to produce pipeline gas.

The second plant ran into difficulty. This plant, as engineered and constructed for Imperial Oil at Nottingham, Sask., Canada, was intended to treat a gas containing about 0.8% H_2S and 0.6% CO_2, to yield a sweetened gas containing 1 g. H_2S/100 std. cu. ft. The design[5] used a split-flow arrangement, scrubbing the gas with cold potassium carbonate solution in the top section of the absorber to reduce the H_2S content to meet pipeline specifications. When starting with fresh solution, the gas was sweetened satisfactorily; however, after several hours of operation, the H_2S content of the treated gas increased considerably. Many observers[1,2] reasoned that the difficulties were caused by the high H_2S:CO_2 ratio in the feed; that this high ratio caused a large part of the alkali solution to become tied up in a nonregenerable form.

Laboratory tests made early in 1960 by Fluor's research division showed that hot carbonate solutions are regenerable when treating gases containing H_2S and CO_2, even when the ratio of H_2S to CO_2 is high. These tests also showed that the equilibrium H_2S remaining in the regenerated solution is too high to reduce the H_2S content of the product gas to meet pipeline specifications without further treating.

Later, the Bureau of Mines[4] published data which indicate that it is necessary to wash the gas with fresh



COMPOSITION OF ABSORBER OVERHEAD remained almost constant after the system reached equilibrium. Fig. 2.

potassium carbonate or potassium hydroxide solution to reduce the H_2S content to 1 g./100 std. cu. ft., or less.

In view of these data, the high H_2S vapor pressure of the regenerated solution, rather than the high H_2S:CO_2 ratio in the feed, appears to have been the cause of the Nottingham difficulty.

The Fluor tests provided a sound understanding of the process, but were not long enough to prove beyond question that hot carbonate solution would not deteriorate after prolonged use with a high ratio of H_2S:CO_2 in the feed. To demonstrate that the solution is stable under these conditions, Fluor, in conjunction with the owners of the Benfield process, constructed a small test unit, installed it in an operating gas field owned by Canadian Fina Oil Co., Ltd., and operated it continuously for 25 days treating field gas containing 13.4% H_2S and 4.6% CO_2. During the test, regular analyses were made of the circulating solution and of the gas streams entering and leaving the plant. The results are described later, following a brief description of the test unit.

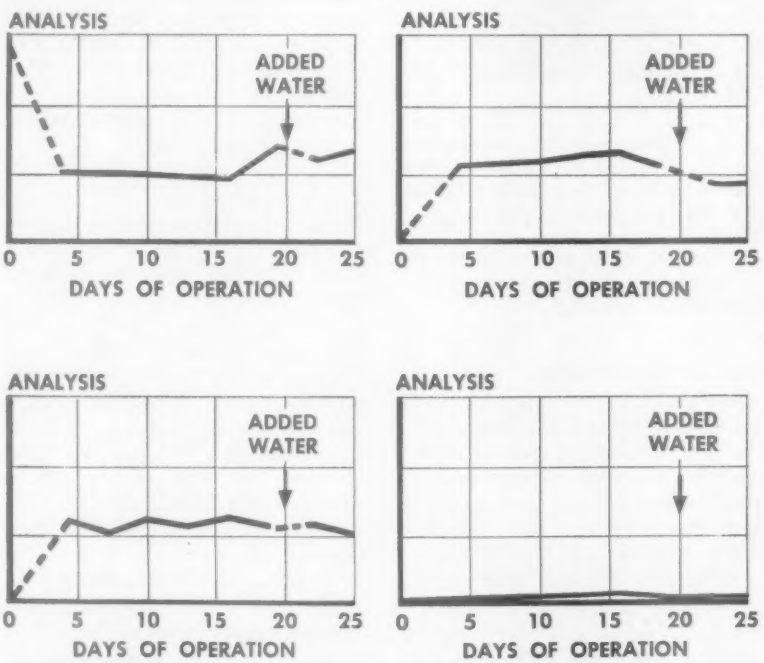
The process flow scheme used during the tests is illustrated on Fig. 1. Basically the test unit consisted of an absorber in which the acid gases were removed from the feed gas by an aqueous solution of potassium carbonate, and a stripper in which the acid gases were desorbed from the solution by steam vaporized in the reboiler. The feed gas, at 1,500 psi., first passed through a knockout drum, and a pressure-reducing valve which maintained the absorber pressure at about 700 psi. The feed gas entered the bottom of the absorber and flowed upward through the column countercurrent to the stream of hot carbonate solution. The absorber overhead gas passed through a knockout drum, was expanded to atmospheric pressure, and vented to a flare.

The rich solution from the bottom of the absorber passed through a level-control valve into the top of the stripper. In this column, operating at about 10 psig., the liquid flowed down the column countercurrent to water vapor rising from the reboiler. The stripping action of the steam released the acid gases from the solution, passing them overhead from the column.

The stripper overhead gases flowed through a water-cooled condenser, in which most of the water vapor in the gas was condensed. The water was separated in a knockout drum and returned to the reboiler. The gas was expanded through a back-pressure control valve and vented to a flare. The lean solution was pumped from the reboiler back to the absorber to complete the circulation loop.

After preliminary testing, the pilot plant was charged with fresh potassium carbonate solution and started up. The unit them ran continuously for 25 days with only 2 hours' downtime for repairing minor leaks and plugs. The hot carbonate solution was no charged during the 25-day run and no additional salts were added. On the twentieth day of operation distilled water was added to the reboiler to replace that which has been gradually lost from the system with the off-gases.

Test results. Data recorded during the run include:



ANALYSIS OF SOLUTION for K_2CO_3, $KHCO_3$ (top), KHS, and $K_2S_2O_3$ (bottom) showed that composition remained fairly constant after the solution had reached equilibrium. Solution was gradually concentrated during the run because water was carried away with the offgases. Figs. 3, 4, 5, and 6.

1. Analyses of the acid gas content of the feed, absorber overhead, and stripper overhead streams.

2. Periodic analyses of the circulating solution for K_2CO_3, $KHCO_3$, KHS and $K_2S_2O_3$.

3. Operating conditions such as temperatures, pressures, flow rates, etc.

A graphic representation of data taken during the 25-day run are shown on Figs. 2, 3, 4, 5, and 6. The average acid gas content of the feed, 13.4% H_2S and 4.6% CO_2, was reduced to 0.03% H_2S and 0.07% CO_2.

The solution composition reached a state of equilibrium in about 3-4 days, after which the composition remained fairly constant. The solution was gradually concentrated during the run because of the loss of water from the system with the off-gases. The changes in the relative quantities of $KHCO_3$ and KHS are directly traceable to the changes in the feed ratio of H_2S and CO_2. As the proportion of CO_2 in the feed increased, the quantity of K_2CO_3 in the liquid increased, and the quantities of $KHCO_3$ and KHS decreased. At the end of the test period, the solution was clear.

Conclusions. The test firmly established that the hot carbonate solution used for treating a gas containing a substantial quantity of H_2S as well as CO_2 is stable as shown by the following:

1. After an initial period during which the system reached equilibrium, the absorber overhead analysis and the solution composition remained substantially constant for the remainder of the test.

2. The solution absorption efficiency, defined as the percentage of available K_2CO_3 which reacts to remove H_2S and CO_2, remained high throughout the entire run. To confirm that the absorptive capacity of the solution had not decreased with use, a special 12-hour run was made on the twenty-third day at high feed gas and low solution rates. During the special run the absorption efficiency averaged 77%, which compares favorably with the maximum figure, 78%, attained over the 25-day period.

The tests also confirmed that the hot carbonate process is a reliable system for the removal of the bulk of the acid gases from feed streams containing H_2S and CO_2.

Acknowledgment

Fluor Corp., Ltd. expresses its gratitude for the assistance provided by Canadian Fina Oil Co., Ltd., during the installation and operatiton of the test unit in Canadian Fina's facilities in Wildfall field near Whitecourt, Alta., Canada.

References

1. J. L. Arnold, et al., "A Study of COS in Natural Gas Processing": presented at CNGA meeting in Calgary, Alta., June 9, 1960.
2. T. E. Buck, Petro Process Engineering, (September 1960).
3. C. H. Crow and J. R. Dungan, The Oil and Gas Journal, November 24, 1958.
4. J. H. Field, et al., Bureau of Mines R. I. 5660, (1960).
5. J. A. Goolshee and H. K. McLaughlin, Petroleum Refiner, Vol. 39, No. 1 (January 1960).

Next Week:

Canada's Alive With Activity

THE JOURNAL focuses on the changing pattern of Canadian oil and gas activity in its annual Canadian Report.

On - the - scene reporting by three Journal editors will bring you the latest on Canada's first national oil policy, what to expect in demand and production, and what's happening in natural-gas transmission and gas-liquids output.

Watch for this timely Canadian report next week.

Nelson Refinery Cost Indexes

Published in the first issue each month in the Technology-Operation Section.

Compiled by W. L. Nelson, Technical Editor and petroleum refinery consultant, Tulsa.

Charts of the indexes are published each year in a late January or early February issue.

Indexes of selected individual items of equipment and materials are also published on the Costimating page in the first issue of the months of January, April, July, and October.

Refinery Construction Cost Index (1946 Basis)

(Explained on Page 101 of the issue of August 5, 1957)

	1950	1954	1957	1958	1959	1960	Mar 1961
Pumps, compressors, etc.	138.2	166.5	206.7	214.7	226.5	228.3	229.1
Electrical machinery	134.9	160.0	188.9	192.7	195.8	195.2	192.7
Internal-comb. engines	126.0	150.5	173.9	178.3	178.5	180.7	180.9
Instruments	127.8	154.6	187.4	194.9	201.0	202.5	207.5
Heat exchangers	140.0	171.7	203.6	181.2	178.9	194.0	186.3
Misc. equip. average	*126.2	160.7	192.1	192.4	196.1	200.0	199.3
Materials component	149.5	174.6	201.9	204.2	207.8	207.6	208.0
Labor component	144.0	183.3	208.6	220.4	231.6	241.9	†245.2
Nelson construction index	146.2	179.8	205.9	213.9	222.1	228.2	228.3

Refinery Operating Cost Indexes (1956 Basis)

(Explained on Page 171 of the issue of June 1, 1959)

	1946	1952	1954	1958	1959	1960	Feb. 1961
Fuel cost	49.6	81.0	86.5	102.1	103.5	109.9	113.4
Labor cost	73.1	88.7	90.9	105.0	102.3	100.3	99.2
Wages	52.4	81.5	88.7	105.4	111.5	113.0	119.8
Productivity	68.3	90.2	97.1	100.3	109.0	112.9	120.7
Investment, maint., etc.	51.2	83.6	92.0	109.5	113.7	116.9	118.0
Chemicals cost	37.0	72.1	85.7	104.4	107.8	114.3	104.0
Operating cost indexes:							
Refinery	58.5	80.5	88.7	105.8	106.8	108.8	107.7
Process units‡	62.9	82.2	88.4	105.8	106.0	107.2	107.6

*Used in computing the Nelson Index until April 1952. †Converting Labor Component to 60% skilled labor rather than 50:50. Transition will be complete by May 1961. ‡Add separate index for chemicals, if any are used.

TRUCK FLEET has been updated and new equipment added. Trucks on left are equipped with a 1,250-g.p.m. pump, 1,000 ft. of hose, mechanical foam, a foam tower, nozzles, two-way radio, gas masks, hose holders, and other necessary equipment.

Organization is key to fire control

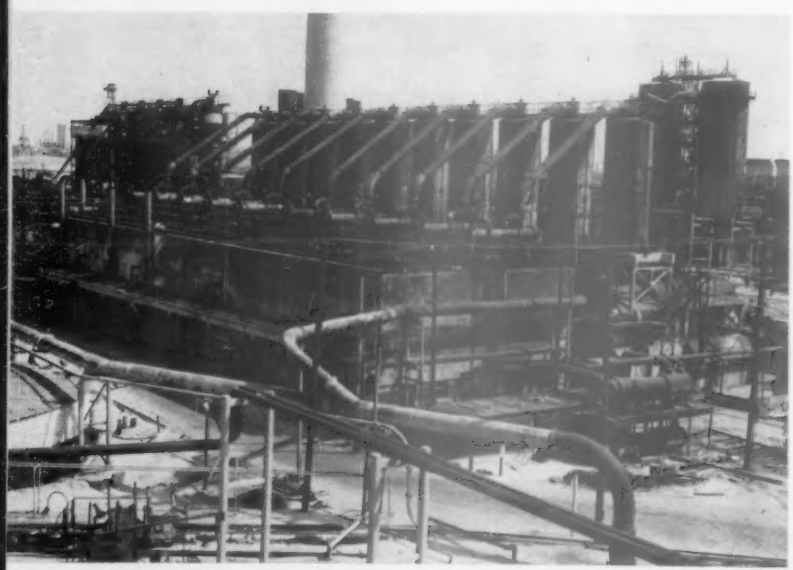
Here's how fire-fighting crews meet an emergency at American Oil Co. The plan guarantees getting there first with the most

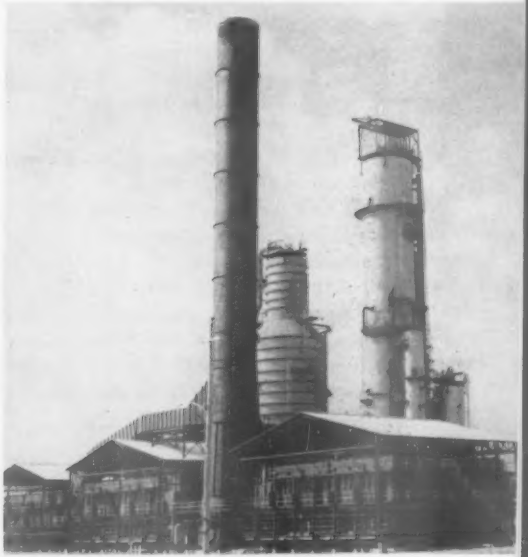
AT WHITING we have always taken pride in the quality of our organization and facilities for fighting fires. But the modernization program which we are now undergoing has forced us to extend our effort even further.

Small units are being replaced with large ones. The congestion of old facilities is being corrected by better laid-out and dispersed units of modern design.

At the same time, fires, while less frequent, can be more serious with the larger, more complex units. They require a well-trained fire-fighting force and adequate equipment.

With these things in mind, the fire-fighting organization has been modernized to cope with this new set of problems. Here's a brief look at our system and the way it operates.





AS THE OLD (left) gives way to the new (right) in a modern refinery, new techniques of fighting fires must be adopted. Model organization at American Oil Co.'s Whiting refinery makes effective use of available manpower in a short time.

BY ROY R. WILSON
Superintendent, Heavy Oils Division,
American Oil Co., Whiting, Ind.

Organization

The accompanying chart shows how the fire-fighting force is organized. Its nucleus is the chief fire marshal and his staff. The separation is not necessarily as sharp as that shown in the figure. There is much overlapping, depending on the nature and location of the fire.

The refinery is divided into 12 numbered fire zones. When the fire siren is sounded, it is coded to indicate the zone in which the fire is located.

The first coded siren alarm calls to the fire the shift fire marshal, the chief fire marshal, and three fire trucks which are manned by crews of refinery employes.

In addition, to make the supervisors available on all shifts, other than the day shift Monday through Friday, two emergency call lists have been made up. If the person in authority at the fire orders it, these lists may be called.

If the fire is serious enough, the chief fire marshal or some designated persons orders the siren to be sounded again. This second call brings additional men who are on duty—and can be released for the emergency—plus three more fire trucks. If still more men are needed, there are reserve crews which may be called.

If the fire is considered a major one, the third call is sounded on the plant's "big whistle" by orders from the chief fire marshal, or from a member of the executive group, or the highest ranking supervisor at the scene of the fire.

This is a general alarm to call employes who are off duty and so located that they can hear it. It is the duty of any employe who hears the whistle to report to the fire. The big whistle has been blown only four times since 1927 when it went into operation.

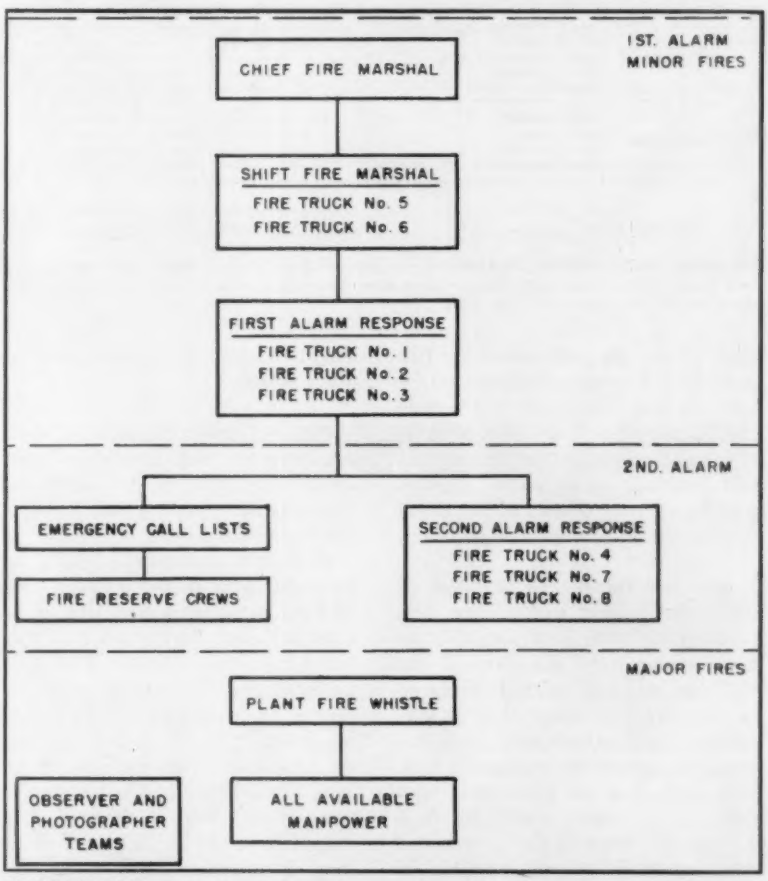
Emergency call lists. We have realized that the job of fire control often depends on the presence of process and mechanical supervisors. To make them readily available during off-duty hours, two emergency call lists have been made up.

The first list includes the chief fire marshal and the division heads and assistants. The second list includes the executive, utilities, mechanical, employe-community relations groups, and the photographers. The persons in these two lists are called to action by the following sequence of events:

The lists are kept in the plant-protection main-gate house which is manned on all shifts. When the first siren sounds, the plant-protection captain on duty goes immediately to the main gate. A patrolman reports to the fire and specifically asks the fire marshal, "Do you need help and should we start calling from the emergency lists?" If the fire marshal says yes, the patrolman radios the captain at the main gate to start calling. He then begins calling from the first list. First the chief fire marshal is called and then a supervisor in the division in which the fire is located.

Simultaneously from another phone a person designated by the fire marshal or someone in authority at the scene of the fire will start to call the personnel in the second list. In the event the first person on either list does not answer, the person calling immediately proceeds down the list until someone is reached.

The superintendent or key super-



COORDINATOR of the fire-fighting force is the chief fire marshal and his staff. Depending on the seriousness of the fire, he has a corps of well-trained men available at all times.

WHITING REFINERY FIRE EMERGENCY CALL LIST NO. 1

1. Call Fire Marshal immediately.
2. Call one supervisor in division where fire is located.
3. Fill out form and forward to Chief Fire Marshal.

FIRE MARSHAL
Call Immediately in Case of Fire

NAME	HOME PHONE	TIME CONTACTED	REMARKS Note if Unable to Contact
Chief Fire Marshal			

DIVISION SUPERVISORS
Call One in Division Where Fire is Located

Division	NAME	HOME PHONE	TIME CONTACTED	REMARKS Note if Unable to Contact
Asphalt	Supt. Gen. Foreman Gen. Foreman			
Chemical Products	Supt. Gen. Foreman Ass't. Gen. Foreman			
Heavy Oils	Supt. Ass't. Supt. Gen. Foreman			
Light Oils	Supt. Ass't. Supt.			

WHITING REFINERY FIRE EMERGENCY CALL LIST NO. 2

1. Call one in each group.
2. Give location of fire.
3. Fill out form and forward to Chief Fire Marshal.

GROUP	NAME	HOME PHONE	TIME CONTACTED	REMARKS Note if Unable to Contact
EXECUTIVE	Ass't. Manager Ass't. Manager Ass't. Manager Ass't. Manager Manager			
UTILITIES	Superintendent Ass't. Supt. Gen. Foreman Gen. Foreman			
MECHANICAL	Superintendent Ass't. Supt.			

TO MAKE SUPERVISORS AVAILABLE during off-duty hours, these emergency call lists have been made up. Supervisors may be called into action by order of the marshal at the scene of the fire.

visor of the division where the fire is located or someone designated by him, perhaps his wife, then calls the other supervisors of the division to the fire. In this manner the call from the plant guard initiates a self-sustaining system to call those people whose presence is required.

The real thing. The real test of these emergency supervisory lists came recently at a serious fire on a reforming unit. As soon as the shift fire marshal reached the scene of the fire, he knew that it was serious and immediately gave instructions to call the emergency lists. The captain of the plant-protection office began calling, and in less than 15 minutes many of the supervisors were on their way to the fire. So many supervisors reported to the fire that it was not necessary to sound the second siren or blow the plant whistle.

Reserve crews. Sometimes, more than in-plant and supervisory personnel are required to handle all emergencies. As a result, reserve fire crews have been organized.

A reserve crew consists of a supervisor, who is the captain, and 10 to 12 employes who live in his neighborhood. Fourteen reserve crews have been formed. This gives an auxiliary fire-fighting organization of 14 captains with 140 to 168 men. While all the crews may not be available when the emergency arises, we believe at least five or more can always be obtained. This should be a satisfactory number for most emergencies.

These reserve captains and their crews have been given fire-fighting training in the classroom and in the field. Where possible, the captain attends the same training session as his men.

In the classroom the men are instructed in the use of all equipment which they might need in a fire emergency, including table demonstrations on the chemistry and nature of fires. Films such as "Know Your Fire Extinguishers" and "Chemistry of Fire" are shown.

In the field the men are trained to use the CO_2, dry chemical extinguishers, chemical and mechanical foam, and water hoses of various sizes. They are also trained to use all auxiliary equipment such as hose reels, shoes, clamps, various types of nozzles, hydrants, and foam towers.

When the emergency requires, the reserve crews are called out by orders from the chief fire marshal or the chairman of the fire committee or by their designated representatives. When the order is given to call them out, the plant guard at the main gate calls the reserve team captains. The captains in turn call their crewmen until five are reached. Each captain then drives to his crewmen's homes and reports to the fire in one group. If five crewmen cannot be reached, the captain brings those who are available to the fire. The captain and crew work as a unit under the direction of the chief fire marshal.

In a recent fire drill the plant guard at the main gate was asked to call the reserve - team captains. Seven of the fourteen captains were reached, and of these, six captains secured five men and one secured four within 20 minutes of the initial call by the plant guard.

Photographers. Teams of observers and photographers are set in action whenever the plant whistle is sounded for a major fire, or whenever called out by the chief fire marshal or some designated authority. Five teams of observers and photographers, each consisting of one observer and one photographer, have been organized. Four of the five teams will be stationed at fixed points around the disaster area. The fifth team is known as the roving observers and photographers.

It is the duty of these teams to record the sequence of events as they develop. An accurate log is

of primary importance in piecing together the critical facts about the disaster. From such recorded data the most effective methods of control for saving lives and property may be determined.

Fire Equipment

Refinery modernization not only has its effect on the fire-protection organization, but it affects the physical equipment, too. Many additions and improvements have been made in the past few years to keep our facilities up to date. Operation of most of the newer equipment requires fewer men, thus increasing the amount of fire protection a given force is able to provide.

Turret nozzles. Less than 10 years ago there was not a turret nozzle in the refinery. Today more than 160 are installed in key positions. They are now standard equipment on all newly constructed units. Recently we added a portable turret nozzle to one of the fire trucks. It can be attached to any standard fire hydrant.

A turret nozzle has the advantage that only one person is required to put it in operation, and once in operation it does not need to be attended. It is an extremely valuable piece of built-in fire protection. Often operators or others have them in operation before the first-line fire crews arrive.

Foam towers. Less than 5 years ago all foam towers were of the manually operated type that required 8 to 10 people to erect. They were cumbersome to handle and were slow to be erected and put in operation. Today all foam towers are hydraulically operated and can be erected and put in operation in a few minutes by four to five men.

A large number of hose holders have been purchased. These permit the fire hose to be set at key places without being manned except to change positions. Use of hose holders enables a few men to apply a number of hose streams as rapidly as they can be set up, which takes practically no more time than to lay the hose and connect it. The hose holder makes more effective use of the men fighting the fire and removes them from the critical danger zone.

The refinery is progressively changing over to mechanical foam. The older chemical foam requires a crew of 10 to 20 men to handle and supply the foam generator. Mechanical foam can be set in operation in much less time by two to four men. This change greatly increases the effectiveness of a fire-fighting crew.

Fire trucks. All fire trucks, the chief fire marshal's car, patrol cars, many refinery trucks, and key offices are equipped with radios. In addition, a large number of portable radios are available. This is a great asset for any emergency and a necessity in case the telephone system is rendered inoperable by fire or explosion.

Two large fire-truck pumpers have been added to the fleet of six smaller fire trucks. The new pumpers are equipped with modern facilities, including a 1,250-g.p.m. pump, 1,000 ft. of hose, 750 gal. of 3% mechanical foam, one hydraulic foam tower, many different kinds of nozzles, two-way radio, and other necessary equipment, such as gas masks, air-paks, hose holders and clamps, various kinds and sizes

TURRET NOZZLES are standard equipment on all new units. More than 160 are located in key positions throughout the refinery.

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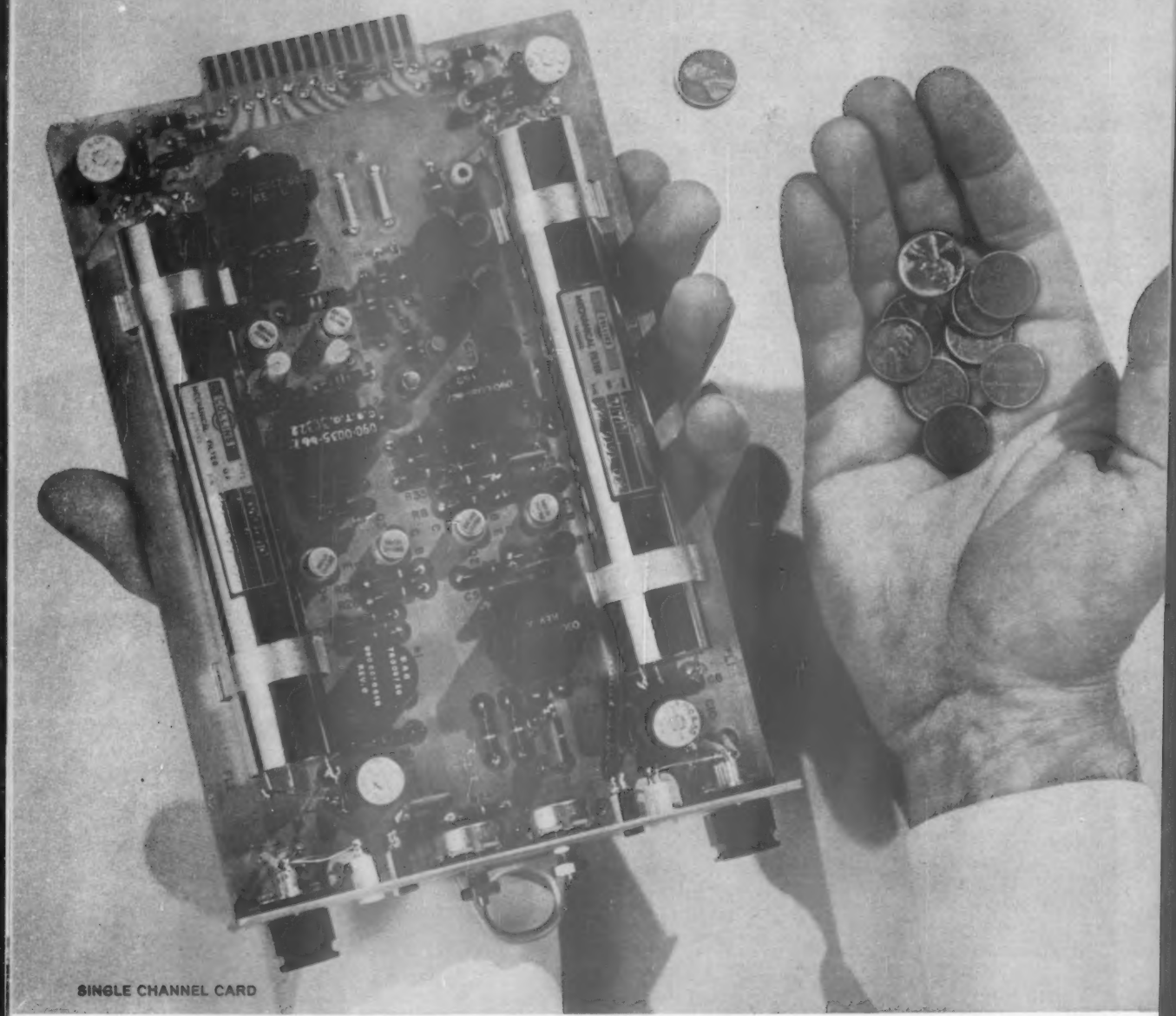

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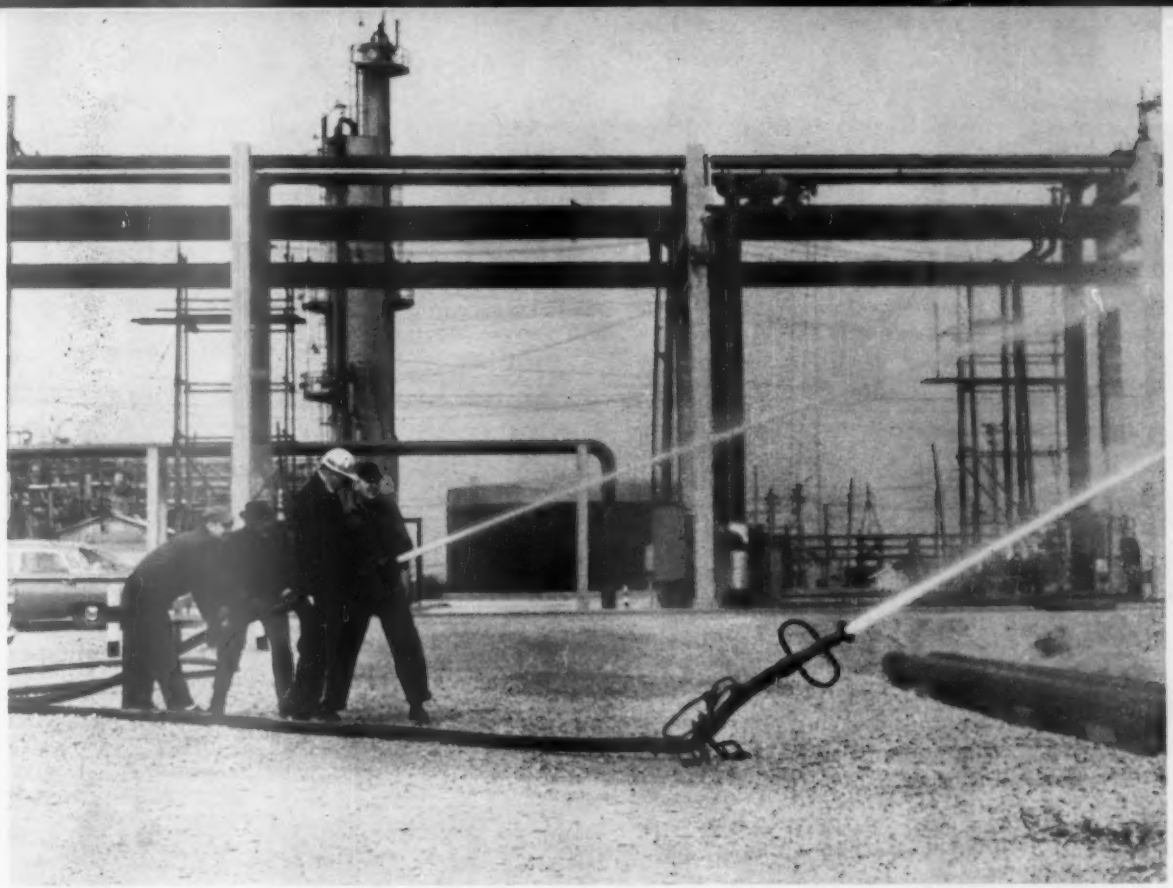


COMPARE HOSE HOLDER in operation with the conventional hose and nozzle which takes three to four men to operate. These holders enable a few men to do the work of many.

of wrenches, and hand dry-chemical fire extinguishers.

The primary firewater system consists of three electrically driven and two steam-turbine-driven pumps that have a combined capacity of 13,200 g.p.m. at 150 psi.

In addition to the primary firewater pumps, we have seven emergency pumps. Two are gasoline-engine driven and five were recently equipped with diesel drivers. These emergency firewater pumps are located strategically in the plant and can deliver a combined total of 16,000 g.p.m. at 150 psi.

. . . The fire-training program has been accelerated to keep our personnel informed of the latest information in fire protection. Our training program, both in the classroom and fire-training field, has been expanded and given to more employes.

In the classroom, extensive use is made of training films and Standard Oil Co.-prepared books such as the "Hazard of Water in Refinery Process Systems" and the "Hazard of Air (Oxygen) in Refinery Process Systems."

In the field, first-hand experience is given employes in extinguishing actual fires with the equipment which would be used in fire emergencies. Annual fire-marshal meetings are held for personnel from all the company's refineries to study up-to-date fire-prevention and protection practices.

Fire committee. All of the refinery fire-protection activities are headed by the fire committee which reports directly to the refinery manager.

It includes top supervisors from all operating and maintenance divisions and has representation from the executive group, research, engineering, and the insurance department. This committee meets monthly and makes recommendations to management on existing facilities and new projects. And it inaugurates new fire-fighting and prevention policies.

The refinery fire committee is divided into subcommittees. They meet as often as necessary to study new methods and new designs and to inspect buildings and equipment. Written reports of the subcommittees are given to the fire committee for further study and approval. One important duty of the subcommittee is to review a check list of built-in fire protection for all new processing units.

The fire committee is one of the oldest and most active committees in the refinery organization. Over the years other refineries of American Oil Co. have organized fire committees which are staffed and function in essentially the same fashion. We believe that a problem-centered group of this nature is the best means of insuring that fire-fighting problems will be anticipated and met effectively.

While our ideal is to prevent fires, ideals are rarely achieved in practice. The next choice is to provide the equipment, personnel, and training to meet any fire emergency. In an oil refinery, the work of such a committee is never finished.

Acknowledgment

The author thanks J. C. Ducommun, vice president of manufacturing; E. G. Wiley, assistant manager, and J. R. Goff, chief engineer, and other members of the refinery fire committee for help in the preparation of this paper.

BY W. L. NELSON
Technical Editor and
Petroleum Consultant

Questions on
TECHNOLOGY

How sulfur and gravity affect crude-oil value

Your answer of July 18, 1960, "Does it Pay to Desulfurize . . ." seems to indicate that the value of crude oil is almost an exact function of percentage of sulfur, whereas gravity is not as good a criterion of value. Is this true? M. F. B.

Neither sulfur nor gravity can be perfect properties for indicating the value of crude oil. The linear relationship between percentage of sulfur and value seen in the answer of July 18, 1960, is only a coincidence. Sulfur, because of its powerful effect on value, is probably superior to gravity but variations are very large (see Fig. 2). The variations are caused to some extent by the distribution of products (gravity is the common way of describing changes in distribution). However, there are other powerful differences in the properties of the oils such as characterization factor (naphthenicity or paraffinicity) and especially octane number of the gasolines contained in or produced from the crude oil.

The 33 sets of data used in Fig. 2 were computed in the same manner as the 6 sets of data used in the answer of July 18, 1960. All of these are based on the "low" product prices of Platt's Oilgram (Nov. 14, 1959), except that estimates had to be made for a few prices such as No. 3 distillate, gasoline at New York, etc. A plot similar to Fig. 2 but using value against gravity showed even poorer consistency than that of Fig. 2. The average relationships between gravity, percentage of sulfur, and value are:

API	%S	$/bbl.
45	0.03	*3.24
40	0.30	2.88
35	0.65	2.73
30	1.15	2.53
25	1.73	2.37
20	2.32	2.26
15	3.0	2.18
10	4.1	2.12

*High because several oils contained valuable lubricating oils or wax.

These relationships were analyzed to obtain the following empirical formula which applies to values at gulf ports as of November 14, 1960:

$$\$/\text{bbl.} = 0.025\ G^{0.8} - 0.3\ S^{0.5} + 2.5$$

in which G is API gravity and S is per cent sulfur.

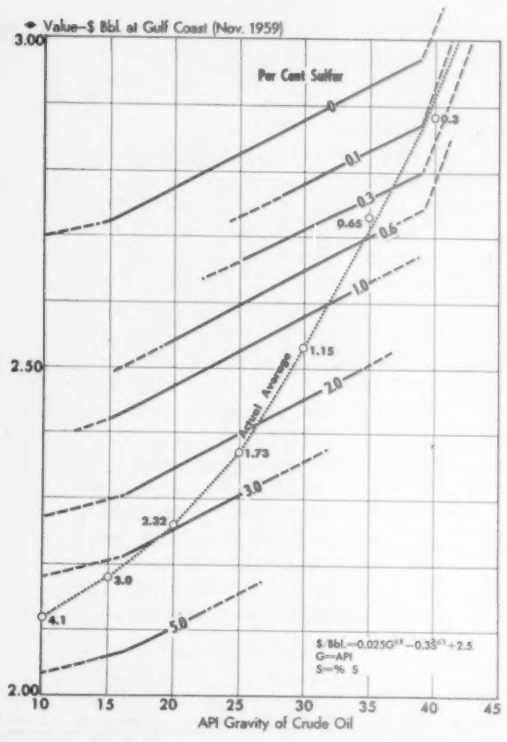
This equation is plotted in Fig. 1 and the basic data are indicated as a dashed curve. From Fig. 1 it appears that the effect of gravity on value is about 1 cent (per bbl.) per degree API. Sulfur decreases the value of an oil by the following amounts:

Range	Ct./%S
0.1-0.3	35
0.3-0.6	20
0.6-1.0	17.5
1-2	12.5
2-3	9.5
3-5	7.5

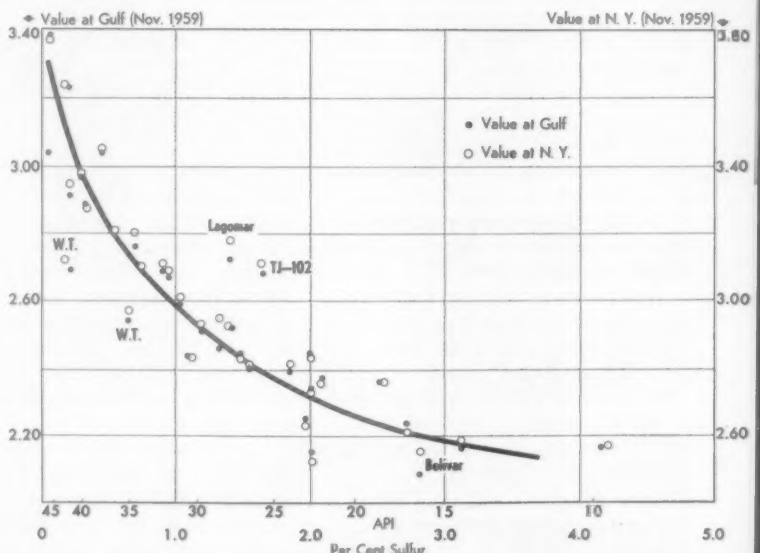
Stated in another way the value of 30 API crude oil as a function of sulfur is:

*Zero % S	*$2.88
0.1	2.78
0.3	2.71
0.6	2.65
1.0	2.58
2.0	2.45
*3.0	*2.36

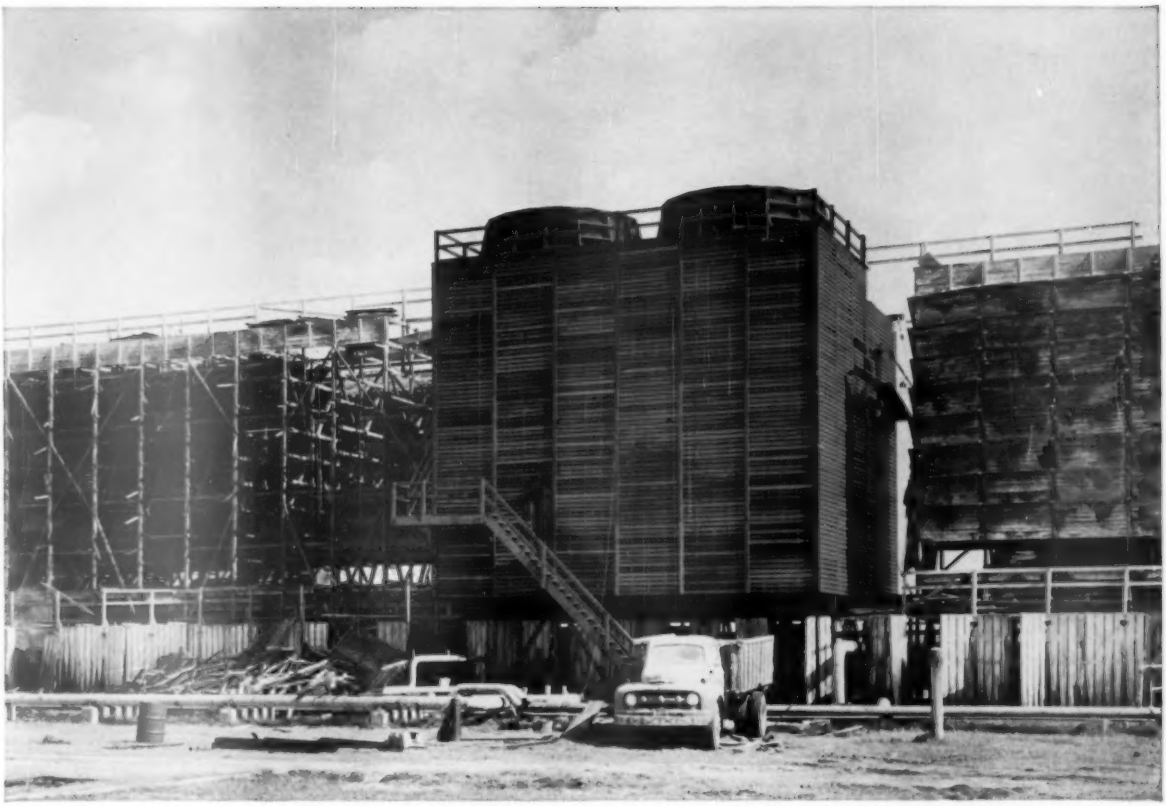
*Quite rare, if not hypothetical situations.



VALUE of crude oil as a function of gravity and percentage sulfur. Fig. 1.



VALUE of crude oils versus percentage of sulfur. Fig. 2.



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The work of dismantling, remodeling, and erection required 27 working days, and total shutdown time was less than 24 hours.

Although deterioration of the old tower necessitated its replacement, plant records show that increased revenue due to lower operating costs and greater product yield because of colder water, will give a *quick return of the investment.*

HUDSON maintains a cooling tower repair and replacement department staffed with experienced engineering and field personnel. Materials are stocked at HUDSON fabricating centers in California and Texas. If your cooling tower is *obsolete* or deteriorated avail yourself of HUDSON cooperation in developing the most economic replacement program.

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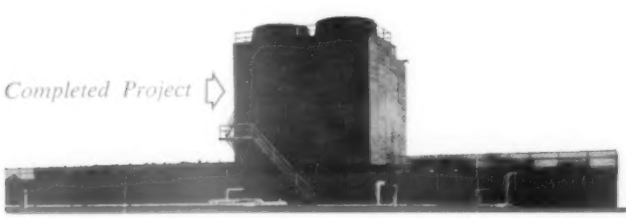

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PROTOTYPE UNIT of the portable bidirectional-type meter-prover unit is making a test run at a West Texas lease battery during winter. Shell Pipe Line Corp. engineers are reading the electronic counter's final count at the finish of the proving run. Fig. 1.

Running-type meter provers are fast, flexible, simple

Wide acceptance of running-type meter proving will increase meter use for custody transfer because it's more efficient, costs less, and is faster method than volumetric prover tanks.

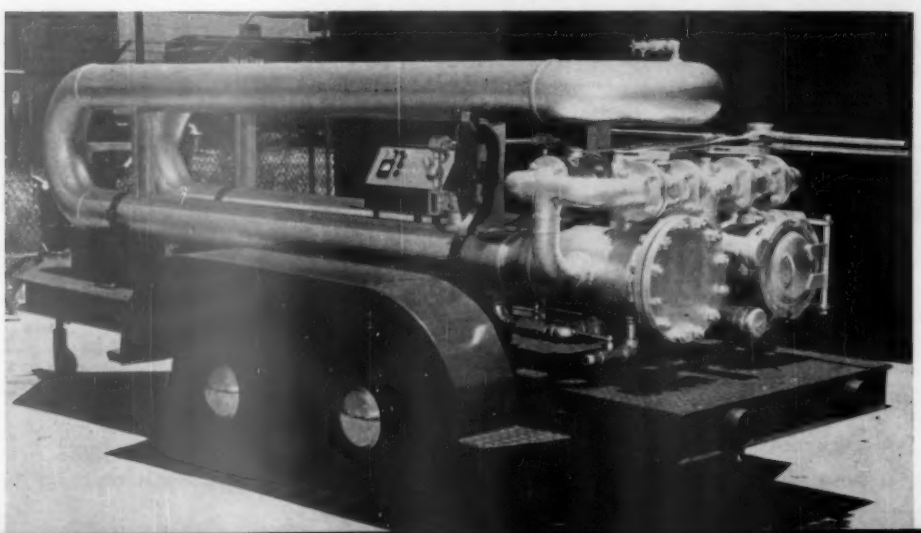
BY H. C. BOZEMAN
Journal Staff

RUNNING-TYPE meter provers, now just finding their walking legs, demonstrate their prowess with all the sureness of a thoroughbred. These are some of their advantages over the volumetric prover tanks long used for pipeline meter proving:

- **Speed.** Proving is done with the meter in service at actual line operating flows and pressures.
- **Flexible design.** Provers can be permanently installed at one location or made portable for proving meters at widely scattered places. Design can be for either bidirectional or unidirectional flow.
- **Ease of operation.** Simplicity of design and operation reduces error possibility which eases the operator's task of proving. Automatic sequential controls permit proving as frequently as it is needed.

Running-type meter proving is a continuous-flow technique which accurately and repetitively displaces a known volume with a displacement-type device that is driven by the flow passing through the meter. Meter volume is compared with known prover section volume to find the meter factor.

Both bidirectional and unidirec-



LATEST MODEL of the portable bidirectional unit features return-bend-type prover pipe layout which shortened trailer length and increased prover volume over the prototype. Manually operated ball valves reverse flow to return the rubber sphere to the starting point. Note the self-contained a.c.-d.c. power-supply panel for operating the tachometer and electronic counter located between the prover piping. Fig. 2.

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Operation. With square butt-ended pipe in position, the Aircomatic Welder is lowered. Pipe ends are aligned and clamped. Amperage, voltage, welding speed and alignment control are preset. A power grinder slices a narrow channel through one half of the joint from 12 to 6 o'clock. The Aircomatic Welder follows the grinder to perform the weld, in one pass, under a CO_2 shield. No hand steering is needed. Following the first weld, a slot then is cut through the opposite half of the joint, and the second weld completed.

Results. The Aircomatic Pipe Welder can finish a circumferential weld in one minute . . . compared to 20 minutes for a manual weld. Welds are slag-free. Weld strength exceeds that of the pipe.

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tional types are built by F. H. Maloney Co., Houston, under Shell Development Co. license. Vanguard Engineers Inc., a Maloney subsidiary, designed the units.

Bidirectional Prover

The displacement device in a bidirectional prover moves first in one direction through the prover section. Then, it returns through the prover section in the opposite direction to complete the proving run.

The prototype bidirectional unit using rubber spheres as a displacement device was built for Shell Pipe Line Corp., Fig. 1. Rubber spheres which had demonstrated good results for batch separators were used as a displacement device.

The prototype unit had an 8-in.-diameter helical coil and about 100-gal. proving section. Initial results showed the unit had excellent accuracy and repeatability which encouraged further research and development.

Design modifications resulted in a return-bend-type prover pipe, Fig. 2. New manifold pipe layout simplifies hose connections and valve-lever operation and minimizes pressure drop. The ends of the prover pipe are enlarged to allow the fluid to bypass the rubber sphere and have spring-loaded shock absorbers to bring the sphere to a smooth stop.

The interior of the prover pipe is coated with a glossy-finish epoxy coating about 0.008 in. thick.

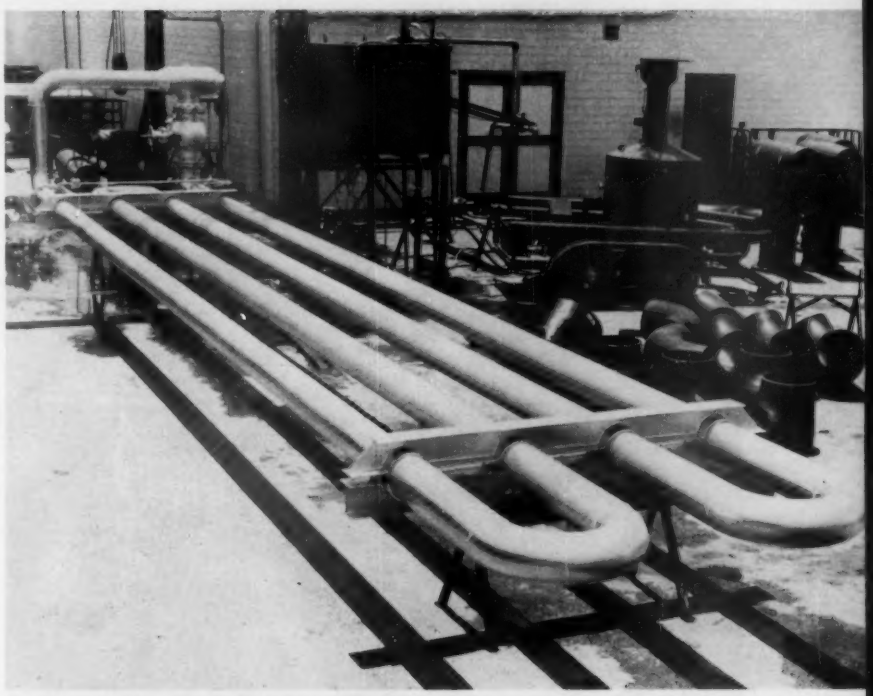
Seal of sphere is important for the prover section to stay in calibration. The sphere is removed periodically from the prover to check diameter which is adjusted by inflating the sphere with water. A slight interference of 1 to 2% over the inside pipe diameter insures a tight seal between sphere and pipe wall.

Unidirectional Prover

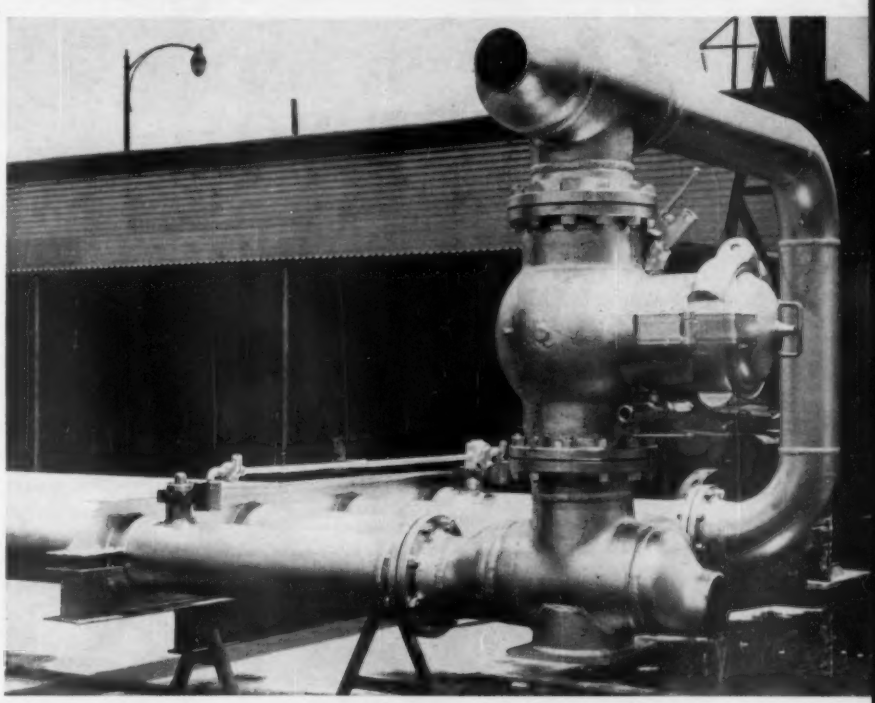
The displacement device in a unidirectional meter prover always moves in the same direction during a prover run. It is launched upstream from the first detector switch and retrieved after passing the second detector.

The Little Big Inch division has installed a unidirectional running-type meter prover at its Carthage, Tex., station, Fig. 3.

The unit will prove a 6-in. posi-



THE LITTLE BIG INCH DIVISION'S unidirectional meter prover during shop calibration tests before shipment to Carthage, Tex. To make a proving run, a rubber sphere is launched from the special ball valve (background). The sphere travels through the prover section (foreground) and returns to the enlarged tee on top of the ball valve. A grating in the tee prevents the sphere from passing downstream. Fig. 3.



SPHERE INTERCHANGE is seen on the unidirectional meter prover. The 10-in. Cameron-Maloney modified ball valve has a blind bore to hold the rubber sphere. The ball valve can rotate 180° to either launch or receive the rubber sphere. Also, the valve body has a quick-opening outlet chamber at 90° rotation to remove or insert the rubber sphere. The chamber can be depressured and opened while the other piping stays at operating pressure. Sphere detector switches are located on the prover pipe to the right of the upper steel saddle. Fig. 4.

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tive-displacement meter that meters product into the Little Big Inch system. The prover is designed for flow rates up to 2,000 bbl. hourly. The interchange piping is 10-in. diameter, prover pipe is 8-in. diameter, and prover section's capacity is about 10 bbl., Fig. 4.

Prover control panel, electronic counter, and meter register will be in the station's office building about 300 ft. from the prover.

Calibrated volume. The prover-section volume in running-type meter provers can be calibrated by one of several methods: master-meter method, water-withdrawal method, and physical measurement.

Master-meter method uses a meter calibrated into a conventional seraphin-neck prover tank.

Water-withdrawal method measures the volume of displaced water between the detector switches by withdrawing water into cans certified by the U. S. Bureau of Standards.

Physical measurement is a careful measure of the length and diameter between detector centers and calculation of prover volume.

Applicable codes require several consecutive runs of the chosen method within specified limits before calibration is complete.

Proving a meter. Here is an outline of the operating sequence for proving a pipeline meter:

1. Fluid is diverted into the prover.
2. Fluid is circulated through the prover until the prover temperature and meter temperature stabilize.
3. Proving runs are made.
4. Meter factor or meter performance is computed by procedure outlined in API Code 1101. Computations correct pressure and temperature to standard conditions.

Single meter installations can leave the prover connected in the product stream. Temperatures and product in the prover and meter thus remain stable and proving is done without delay.

Multiproduct-meter installations have a more complex problem because of the different grades of product handled. Care needs to be taken in displacing the prover volume to minimize slop and product contamination.

Prover volume. A main problem in meter proving is to balance prover volume and resolution of the meter register. Economics of fabrication and operation dictate small prover volumes, although with larger volumes meter errors would be found easier.

A photoelectric tachometer connected to the meter shaft increases resolution. The tachometer consists of a disk of alternating white and black lines driven by a right-angle gear drive from the meter shaft, a light source, and a photoelectric cell.

The pulses emitted by the photoelectric cell go to an electronic counter. Thus, one revolution of the meter shaft is divided into 100, 1,000, or any other desired number of parts.

Output from the photoelectric tachometer is turned on and off by the displacement device. A detector switch is mounted at the start of the prover section. When contacted, the tachometer's output is recorded on the electronic counter. Recording is stopped when the displacement device contacts a second switch at the end of the prover run.

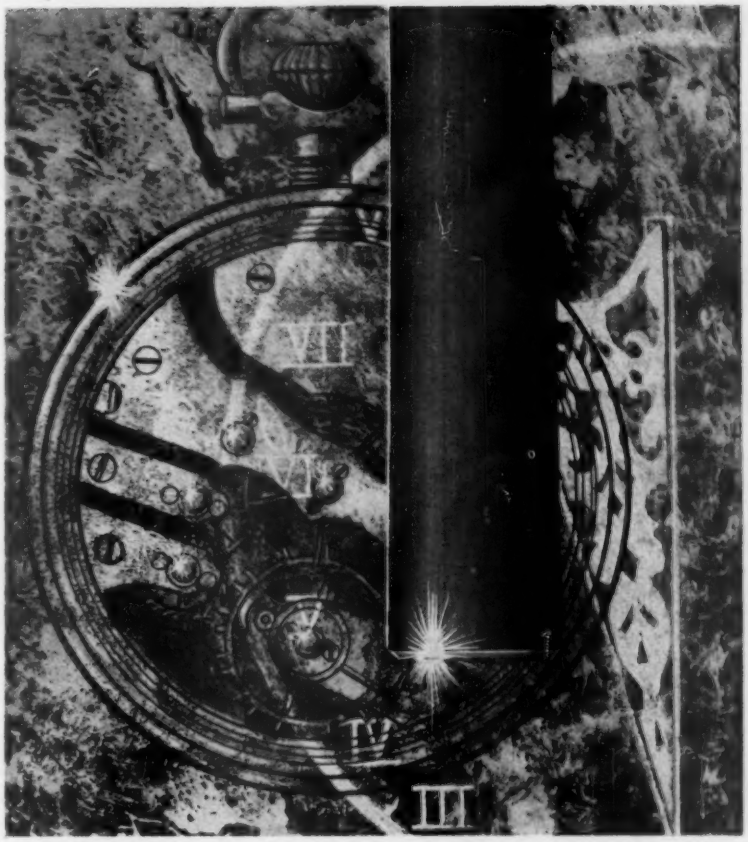
The amount of fluid displaced is recorded on the electronic counter and compared to the calibrated volume.

Conclusions. Running-type meter provers meet the intent of API Code 1101 about operating condition simulation during proving of pipeline meters since these meters operate continuously.

The meter during proving is both measuring product on the meter register and measuring the increment of product displaced in the prover section on the electronic counter.

However, running-type meter provers do not simulate conditions of loading-rack meters which are started and stopped in normal operations. The volumetric prover tank is more suitable for these meters.

Wide acceptance of running-type meter proving will increase meter use for custody transfer. It is a more-efficient, lower-cost, and faster method than volumetric prover tanks. Running-type meter provers also closely simulate actual meter operation.



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Submerged electric centrifugal pumps (continued)

BY JOSEPH ZABA

DISCHARGE of a centrifugal pump depends on three factors; (1) speed, (2) design, and (3) the head against which the pump is operating.

This means that once the pump of a given speed and design is selected it will deliver the expected amount of fluid only if the head against which the pump is working remains unchanged. Further, as shown in Fig. 63, the efficiency of a submerged electric centrifugal pump is high only over a limited range of combinations of head and capacity and falls off sharply on each side of its peak.

These pump characteristics underline two important facts. First is the need for careful initial selection of equipment. Second is the need for realization by the user that he may be confronted with possible changes in equipment originally selected after the installation has been in operation for a while.

When the installation of a submerged electrical centrifugal pump is considered for any given well, the well's productivity index is first determined by producing the well at different rates, within the capacity of pumping equipment available at the well, and by determining the bottom-hole pressures corresponding to these rates. These data are then extrapolated to higher rates of production to find the heads against which the pump would have to operate at these rates.

However, in the region of higher rates of production the drawdown may not necessarily follow the straight-line relationship with rates. The head against the pump and the pump's delivery may differ from the theoretical one. Because of this fact and because of still another consideration, mentioned below, it is customary to rent the required equipment for 30 days or so during which time the actual performance of the equipment is determined. Then either the original equipment is left in the well or appropriate changes are made.

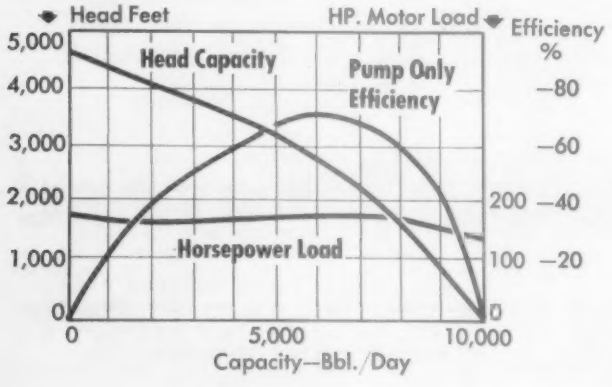
The head against which the pump is to operate consists of feet of lift from the working fluid level plus friction losses resulting from flow through tubing plus any surface back pressure which may exist. With the head determined, design of the installation reduces itself to selection, from manufacturer's data, of the subsurface unit which will fit in the well's casing and which will deliver the desired rate of production against the calculated head.

First step of selection is to find the pump type which fits the casing and has the desired capacity. Performance curves of the pump, like the one shown in Fig. 63, are then referred to. The number of stages required is found by dividing the lift per stage into the calculated head.

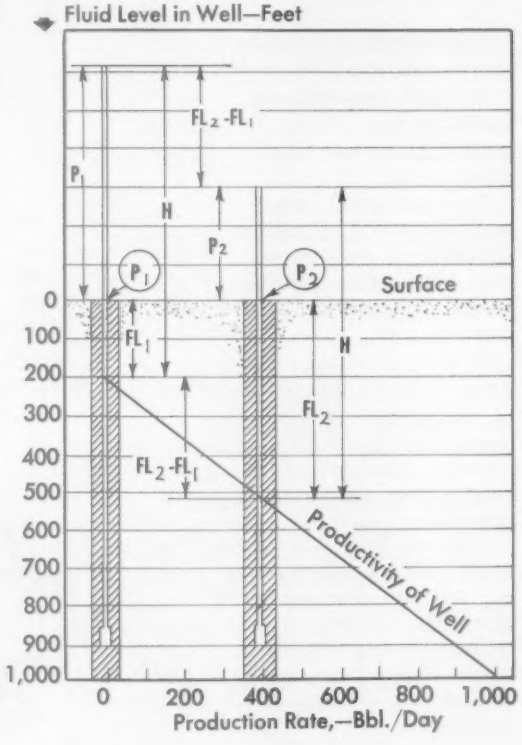
Power requirements are obtained by multiplying horsepower requirements per stage, obtained from the curves, by the calculated number of stages and by the specific gravity of the fluid to be lifted. This determines the nameplate rating of the unit's motor. Highest voltage available for the selected motor is preferred. Sealing section of the unit is then selected to fit the pump and the motor. The size of the cable is determined first by the space available in the casing-tubing annulus, second by the economic compromise between cost of the cable and savings in power costs through reduction of line losses. The last step of design is selection of the desired surface controls.

Efficiencies and costs. Efficiencies increase with increase in the volume of fluid handled. The latest informa-

PERFORMANCE CURVES of a typical submergible, centrifugal pump, with 100 stages, on water test. Fig. 63.



PRODUCTIVITY INDEX of a well equipped with a submergible electric centrifugal pump can be found with a diagram of this type. Fig. 64.



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*the one that's closest to you

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NEW ROCK ISLAND GLASS/REINFORCED EPOXY PIPE

~ A significant development in corrosion control which develops maximum strength because it is

PRE-STRESSED

JUST as with pre-stressed concrete, *pre-stressing* alternate longitudinal and lateral plies of glass roving in Rock Island's new glass/reinforced-epoxy pipe develops maximum, collapse and tensile strength — by placing the load on the *glass* rather than the epoxy resin.

And — as a result of three years of intensive laboratory and field testing — Rock Island has thousands of feet of this significant, new tubing and pipe line (in 2-, 2½-, 3-, and 4-inch I. D. in 20-ft. lengths) performing to high satisfaction in many mid-continent oil fields.

Additionally, Rock Island reinforced-epoxy tubing has been found extremely effective under conditions which require critical corrosion control under high-pulsating pressures. These include: oil production lead lines and tank battery hook-ups; salt water disposal water lines and disposal well tubing; water flood system line pipe and well tubing; as well as chemical industry uses which include corrosive fluid lines and waste water disposal.

For oil field use, Rock Island's new glass/reinforced-epoxy pipe has been designed for rugged, practical application. Upset ends are fabricated into the tubing, during manufacture, for maximum strength. Tubing can be handled in doubles . . . and regular chain tongs may be used in making up joints. Tubing strings can be suspended on slips. Threaded and coupled joints are used, with standard AST 60° stub threads. Adaptors are available for 8 round E. U. E. and normal pipe thread. Dresser-type couplings may be used.

At this writing, Rock Island's new tubing and line pipe are available in 2″, 2½″, 3″, and 4″ sizes. On special order, 6″, 8″, and 10″ line pipe can be fabricated to user's specifications. Future production scheduling includes larger sizes up to 30 inches in diameter. Detailed information and specifications are available. Contact us—today.

ROCK ISLAND

ROCK ISLAND OIL & REFINING CO., INC.
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tion available on the subject is a report on a number of installations in California.[1] Effective lift of these installations ranged from 1,200 to 4,050 ft. and the corresponding volumes from 4,500 to 1,400 bbl. per day. Reported efficiencies were 85% for motors and as high as 70% for pumps. Over-all efficiencies including line losses ranged from 50 to 60%.

Operating-cost data on submerged electric centrifugal pumps have been presented on several occasions. No generalization can be made from these data because of differences in pump types and well conditions, and differences in accounting methods used by various companies. However, power-consumption figures are available, and may be useful since the cost of electricity makes up the largest portion of operating cost.

This consumption, assuming normal fluid viscosity, would vary somewhere between 0.24 and 0.35 kw.-hr. per bbl. per 1,000 ft. of lift, depending on cable size, voltage used, pump efficiency, tubing size, volume handled, and depth of lift.[2] For instance, for 4,000 ft. of lift, normal viscosity, tubing friction losses of 5%, line losses of 3% per 1,000 ft., the power consumption would vary from 0.345 kw.-hr. per bbl. per 1,000 ft. for volume of 500 bbl. per day to 0.250 kw.-hr. per bbl. per 1,000 ft. for volumes from 3,000 to 12,000 bbl. per day.

Application. Large-volume pumping has many and varied applications and is receiving increased attention lately, primarily because of the number of water floods in operation. And the submerged electric centrifugal pump is sharing in this revived interest.[3]

From the operating point of view the pump is applicable under most large-volume well conditions, although decreased pump life can be reasonably expected if sand is produced. Effects of gas on pump efficiency have been minimized by use of separators (Part 50). Corrosion problems of the subsurface unit are handled by use of alloys in its construction. Inhibitors have been used successfully in handling annular corrosion.

be produced along with the oil, and (2) where recovery of oil can be increased or accelerated, with the corresponding increase in profit, by large-volume withdrawals.

Considering the case of individual wells in the second group, the important question is the behavior of the water-oil ratio of the fluid with the

From the economic point of view the field of application of the method may be divided into two groups: (1) where large volumes of water must increased withdrawals. This behavior usually cannot be predicted and this is another reason why the centrifugal-pump equipment is frequently rented for a test period. Cases are known in which increase in the volume of the pumped fluid did not result in increase in oil. However, some spectacular successes have been achieved.

An example is a well in which a centrifugal pump was installed in December 1948. The well was then producing, on beam, 450 bbl. of fluid per day of which 18 bbl., or 4%, was oil. Installation of the centrifugal pump resulted in increase in fluid produced to 2,600 bbl. per day of which 103 bbl. or around 4% was oil. Now, more than 12 years after installation the well is still producing 2,750 bbl. of fluid per day of which 38 bbl. or around 1½% is oil. This is probably an exceptional case, but other cases of substantial increases in oil recovery are known.

As far as field recovery is concerned the classic case is that of St. Louis field, Oklahoma, which in 1937 produced large volumes of water with small percentage of oil.[4] Success of the centrifugal pump in one of the wells led to the drilling of a number of new wells, which were drilled deliberately deep into the producing formation, were acidized and equipped with centrifugal pumps. Substantial recoveries were obtained. Similar was the case of Dupo field in Illinois in 1939.[5]

An interesting application of the submerged electric centrifugal pumps is the large-scale use of small pumps designed for water-well service in lifting large volumes of fluid from wells in a shallow eastern field.[6]

Surface indications. One of the characteristics of a centrifugal pump is the fact that it can be operated with the discharge valve closed. The head generated by the pump under such conditions remains constant for constant speed of operation of the pump. This fact can be used in finding the productivity index of a well equipped with a submergible electric centrifugal pump.[7]

The well to be tested is shut down until static-fluid level equilibrium is reached. The pump is then started, with the tubing valve closed, and the surface pressure noted. The valve is then opened and the well produced until stabilized rate of production is attained. The well is then closed in again, with the pump running and the surface pressure read.

As indicated in Fig. 64, for the zero rate of production the head H generated by the pump consists of pressure P_1 read on the gage and of the feet of head FL, which is the depth of the static fluid level. With pump producing at a stabilized rate and the well shut in, the head H created by the pump is still the same but it consists of the surface pressure P_2 and feet of head FL_2. The drawdown is the head-feet equivalent of pressures noted on the gages:

$$FL_2 - FL_1 = \frac{P_1 - P_2}{K}$$

Where:

$FL_2 - FL_1$ = drawdown for given rate of production ft.

$P_1 - P_2$ = difference in observed surface pressures, psi.

K = fluid gradient, psi./ft.

References

1. William H. Silcox, "High Volume Pumping with Electric Submersible Pumps": a paper presented in symposium on high-volume lifting equipment and methods during spring meeting of Pacific Coast District, API Division of Production, Los Angeles, May 1961.
2. Manufacturer's data.
3. R. W. Parker, "High Volume Pumping Can Up Profits": a paper presented before spring meeting of Rocky Mountain District, API Division of Production, Casper, Wyo., April 1960. See also The Oil and Gas Journal, August 1, 1960.
4. T. P. Sanders, "New-Type Secondary Recovery Developed in St. Louis Pool"; The Oil and Gas Journal, December 19, 1940.
5. Victor Kotschoubey, "New-Type Secondary Recovery in Dupo, Illinois, Field": The Oil and Gas Journal, March 5, 1942.
6. Anonymous, "Water-Well Pumps Lift Oil": Petroleum Week, July 14, 1959.
7. P. E. Loye, "Submergible Electrical Centrifugal Pumping Units and Their Installation": a paper presented before spring meeting of Mid-Continent District API Division of Production, Wichita, Kans., March 1940.

Zaba series nears completion

NEXT INSTALLMENT of Oil Well Pumping, No. 52, by Joseph Zaba, will complete the series that started in the June 13, 1960, issue. This series is one of the most exhaustive studies made of oil-well pumping problems and equipment, and covers design factors of all types of field installations.

Preliminary plans have been made for reprinting the series in convenient reference form. Date of publication of the reprint will probably be in the early fall of 1961.

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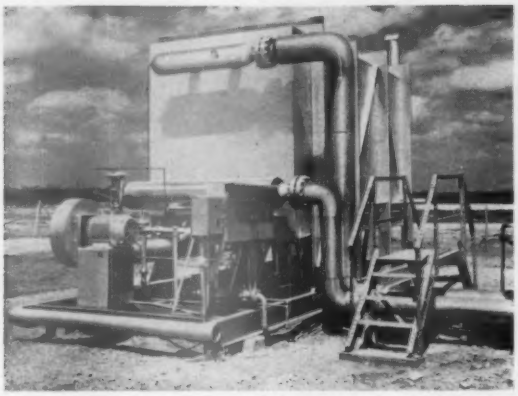
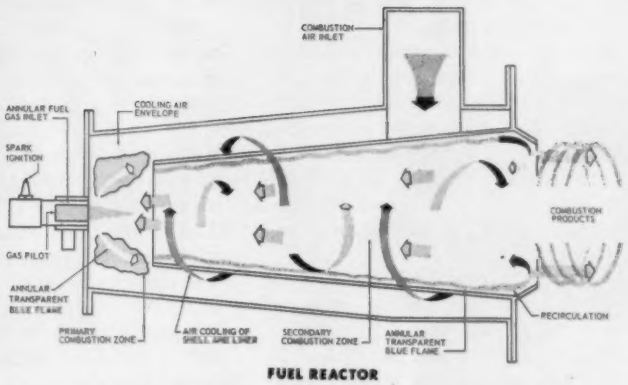


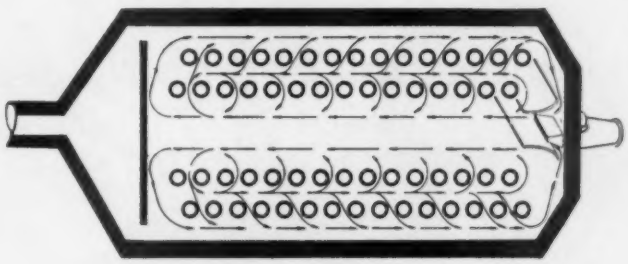
THIS RADICALLY DIFFERENT heat-exchanger design . . .



FUEL REACTOR

features fuel reactor with almost complete combustion efficiency

Heat exchanger designed for safety, better combustion



. . . and provides uniform heat around periphery of each tube.

UNIFLUX heat exchanger, a new product of Black, Sivalls & Bryson, Inc., has been engineered to solve many problems of combustion efficiency and safety normally encountered in process heating. The most important of these is uniform heat around the periphery of each tube and along each tube length. This enables much higher heat-flux rates without exceeding safe tube maximum metal-skin temperatures.

The new heater incorporates a new direct-fired fuel reactor which features almost complete combustion efficiency and instantaneous heat from ambient to 3,000° F.

How It Works

The reactor is a high-intensity mixer, where rapid mixing of fuel and combustion air results in extremely high heat-release rates.

A vortex created inside the reactor causes rapid recirculation of the reacting combustibles and combustion air. This recirculation feature acts as a flame holder and prevents flame blowout even if the mixture flame-propagation velocity is exceeded. It recirculates the incomplete-combustion products back into the reactor to complete combustion.

The floor-fired, cabin-type tubular heat exchanger uses the high-velocity inert-gas discharge as the heating medium. The combustion products include nitrogen, carbon dioxide, water vapor, and nearly 0% of oxygen and combustibles. A lack of oxygen, carbon particles, and combustibles such as aldehydes and carbon monoxide not only improve efficiency, but also lessens oxidation and is an important safety feature.

Little heat loss. The flame is contained within the reactor with heat-release rates up to 10,000,000 B.t.u./hr./cu. ft. of combustion volume. However, there is little measurable heat loss in the noninsulated chamber. This may be demonstrated by placing one's hand on the outer shell with heated outlet temperatures as high as 3,000° F. Because there is no flame extension, the process tube walls are only approximately 1 ft. apart.

Rapid mixing and recirculation around process tubes is obtained by the jet-pump effect of discharging high-velocity jets of hot flue gas into muffles, producing uniform furnace temperatures on both front and back sides of the tube walls. Also, since the flame is contained within the fuel reactor, no flame impingement is possible with process tubes. The 3,000° F. hot gases are quickly reduced in temperature by mixing with the inspirated cooler gases from the rear of the process tubes.

Because of the proximity of process tubes, the skid-mounted heat exchanger is extremely compact. The packaged unit eliminates site erection and saves costly shutdown time.

High convective-heat-transfer coefficients are obtained between the heating flue gas and the process tube walls due to the fast circulation of the gases around the tubes. The heat transfer is therefore between 80 and 90% convective and

only between 10 and 20% radiant.

The high convective-heat-transfer rates enable higher heat-absorption-flux rates with lower required flue-gas temperatures, increasing heater efficiencies of over 80% without economizer section, and 90% with economizer section.

Immediate response is realized because of the high convective-heat-transfer and absence of refractory linings. Not only is the initial cost of expensive linings eliminated, but time is saved. The process fluid can be brought up to operating temperature in a few minutes from a cold startup.

The fuel reactor has excellent stability through a wide range of air-to-fuel ratios—from 50% stoichometric to 100 times theoretical air requirements without loss of flame.

Safety features. These include air purge and flame-failure safeguards and continuous pilots with electric spark ignition. Flame flashback is eliminated even with high-hydrogen fuel due to the mixing of the raw fuel gas with the combustion air inside the fuel reactor.

Positive air purge from a combustion air blower before startup or reignition removes any residual fuel from the heater furnace.

Fire and explosion hazards are minimized during operation because of the inert atmosphere with an oxygen content of only about 0.1%—less than minimum oxygen requirements to support combustion. The unit can be used in field process explosion-danger areas because the combustion air is blown into a gas-tight pressure chamber. The burner is lit by sealed internal spark ignition.

Humble ups polyolefin capacity

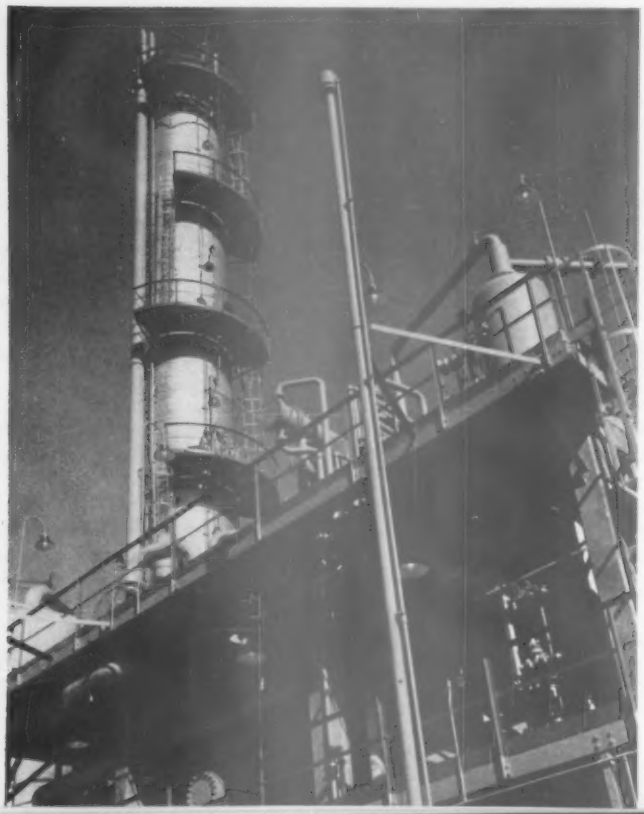
POLYOLEFIN CAPACITY is being increased by Humble Oil & Refining Co. at its Baytown, Tex., plant from 40 million pounds yearly to about 60 million pounds. This expansion will be completed in November.

Also, Humble has approved a second expansion for completion in late 1962 which will raise capacity to 80 million pounds yearly.

Humble's original polyolefin plant started production in early 1960 (OGJ, May 16, 1960, p. 98). It represented an investment of over $30,000,000 in equipment, research, and development.

Currently Humble makes 20 grades of polypropylene. The plant has the ability to make other polyolefins and Humble says a number of these are in the market development stage.

POLYPROPYLENE CAPACITY of this plant will be doubled by two expansion projects scheduled to be completed by late next year.



New isobutylene process by CFR

A NEW extraction process for the production of high-purity isobutylene or the removal of isobutylene from olefins has been developed by CFR (Compagnie Francaise de Raffinage). Badger Manufacturing Co. is licensing the process in the United States.

The process scheme calls for the contacting of feed and solvent, phase separation, stripping of solvent, and redistillation of isobutylene for purity. Since there is no butane contamination of the product, further fractionation is not required. Steps requiring reconcentration or repurification of the solvent are also eliminated. Without the distillation and purification steps required by other methods, both investment and plant operating costs are substantially reduced.

Some outstanding features of the process are: minimum losses to polymer formation; high yields of exceptionally pure isobutylene product; raffinate of very low isobutylene content can be produced if desired; feeds high in butadiene are readily processed.

A recent test run with feeds containing 35% butadiene produced these results: isobutylene product purity of 99.4%, yield 86%; butadiene recovery in raffinate, 98%; less than 2½% isobutylene remained in the raffinate; raffinate met specifications for LPG concerning residue of evaporation; solvent remained clear and unaffected.

The CFR-Badger process is ideally suited to the low-cost production of isobutylene or polymers of isobutylene. It also has considerable advantages in the production isobutylene-free C_4 hydrocarbons such as butane, isobutane, butene1, butene 2, and butadiene for use in polymerization, condensation, alkylation, oxo, and other reactions involving these products.

Photographed at American Oil Co., (Wood River, Ill., Refinery)

New! A far more versatile hydrogen-treating catalyst

Are you still using conventional cobalt-molybdenum desulfurization catalysts on feedstocks high in nitrogen and polyaromatics? Then it will pay you (in production and profits) to investigate AERO® HDS-3 catalyst!

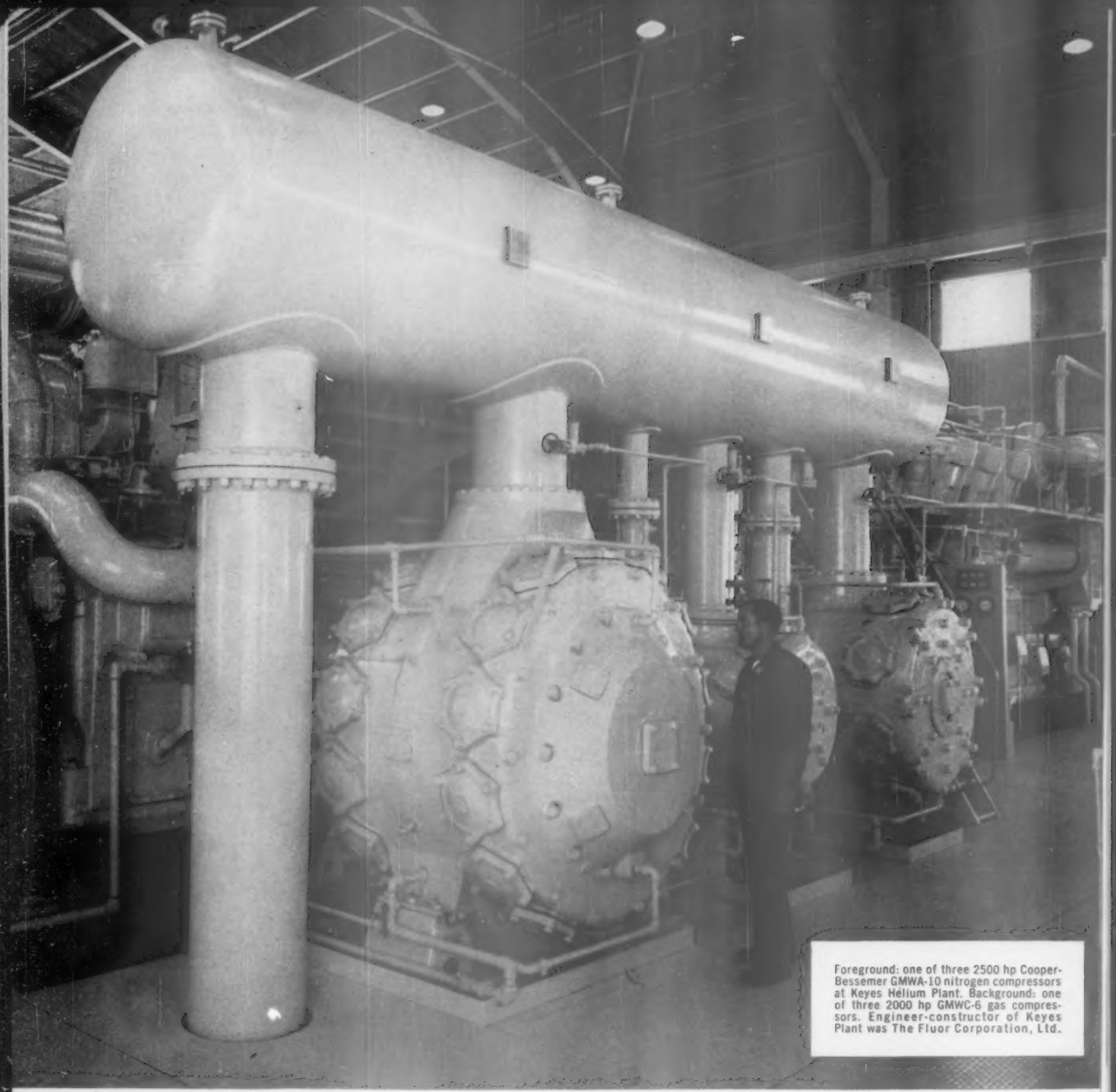
AERO HDS-3 is Cyanamid's brand-new nickel-molybdenum catalyst. Its biggest advantage is an unparalleled capacity for removing nitrogen and polyaromatics. In life tests, it markedly outperformed—and lasted longer than—conventional cobalt-molybdenum catalysts. It is also superior in sulphur-removal; in improving the color of waxes; in hydrogenation of feedstocks and middle distillates.

Behind this newest catalyst lies the experience of Cyanamid as a major producer of both catalysts and other chemicals. That experience is yours when you call your Cyanamid salesman—"The Man with the Golden Rule." Ask him—or write us—for the full data on AERO HDS-3.

Basic in catalyst chemistry

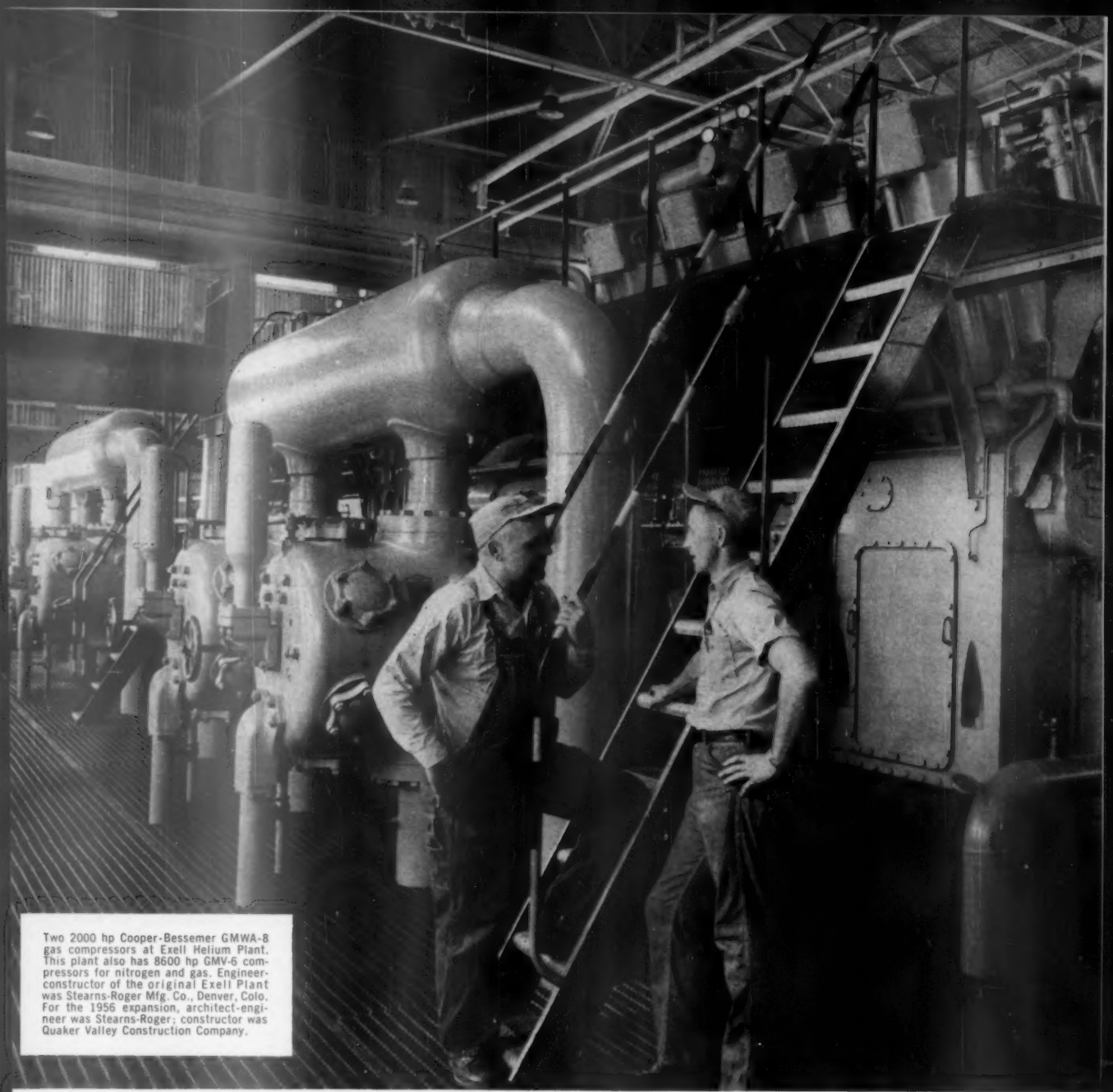
CYANAMID

AMERICAN CYANAMID COMPANY • REFINERY CHEMICALS DEPARTMENT • Bound Brook, New Jersey



Foreground: one of three 2500 hp Cooper-Bessemer GMWA-10 nitrogen compressors at Keyes Hélium Plant. Background: one of three 2000 hp GMWC-6 gas compressors. Engineer-constructor of Keyes Plant was The Fluor Corporation, Ltd.

How U.S.A. puts the squeeze on its helium



Two 2000 hp Cooper-Bessemer GMWA-8 gas compressors at Exell Helium Plant. This plant also has 8600 hp GMV-6 compressors for nitrogen and gas. Engineer-constructor of the original Exell Plant was Stearns-Roger Mfg. Co., Denver, Colo. For the 1956 expansion, architect-engineer was Stearns-Roger; constructor was Quaker Valley Construction Company.

The job of extracting helium from natural gas is a low-temperature process in which compression plays a key part. And that's where Cooper-Bessemer horsepower comes in . . . in a big way.

At our country's two principal existing helium plants —the Exell Plant near Amarillo, Texas, and the Keyes Plant at Keyes, Oklahoma—Cooper-Bessemer gas engine compressors play key parts in both of the basic, heavy-duty compression operations for helium extraction . . . compressing nitrogen for refrigeration and boosting pressure of natural gas for return to supply lines.

At Exell, built during World War II and expanded in 1956, ten C-B compressors total 8,800 hp.; at Keyes, completed in 1959, six total 13,500 hp. All of the Cooper-Bessemer units in both plants are giving reliable service, 'round-the-clock in the production of this highly important inert, lightweight gas for industry and the U. S. defense program.

Call our nearest office for information on C-B products for *your* compression and power facilities.

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Here are case histories of

2 water floods *that really worked*

Success in water flooding depends on injection-water efficiency. In these two Indiana floods, maximum or near-maximum efficiency was realized. Recovery due to water flooding will reach 2.5 times that under primary operation.

BY W. RAY STAPLES

. . . consulting engineer in Dallas with 17 years' experience in evaluation and secondary-recovery operation. Before opening his consulting office he had 11 years of drilling and production experience in various oil-producing areas.

HOW MANY FLOODS will yield 475 bbl. per acre-ft. of sand?

Not many. But that's what is expected from the Caborn and Springfield floods in central Posey County, Indiana.

Formation being flooded is the Mansfield sand, Pennsylvanian in age. Depth at this location is about 1,200 ft.

The Caborn water flood reached its maximum producing rate of 1,465 bbl. of oil daily by injecting 2,086 bbl. of water. The primary recovery has been 120 bbl. per acre-ft., and the secondary 471 bbl. per acre-ft.

The Springfield water flood reached a maximum rate of 800 bbl. of oil daily by injecting 820 bbl. of water. The primary recovery has been 110 bbl. per acre-ft. and the production-decline curve shows that 475 bbl. per acre-ft. will be recovered by water flooding. Secondary oil recovery is estimated to be 2½ times that of the primary since these projects actually had not reached their economic limit before water flooding was started.

Superior knowledge or ability in selecting the water-injection well pattern, or the water-injection rate, is not considered as the reason for the success achieved. Rather these case histories show that the Mansfield zone is well adapted to secondary-recovery operation by water injection.

Performance of these two water floods is presented in graphic and tabular form.

History of Caborn project. The Caborn water flood located in 19 and 30-6s-12w and 24 and 25-6s-13w, Posey County, Indiana, was discovered in 1941, and by the end of 1942 the field had been well defined.

The Mansfield sand is the principal producing zone although production was obtained from the Tar Springs, Waltersburg, and Palestine sands on the outlying edges of the Mansfield sand reservoir. A total of 18 producing wells was completed on 10-acre spacing during primary development. Water injection was started in one well in May 1950, and 14 additional water injection wells were drilled during 1951 and 1952 to complete the project. These fill-in water-injection wells, drilled on the lease lines, reduced the well density to 5 acres with 660-ft. spacing between like wells. The wells were completed by cementing 5½-in. casing on top of the Mansfield sand and shooting the entire producing section with 2 qt. of nitroglycerin per foot of sand.

History of Springfield project. The Springfield water flood located in 31 and 32-5s-5w, Posey County, Indiana, was discovered in 1948. By 1949 primary development was completed, and the productive limits of the field were thought to be defined. However, additional development was undertaken after the flood was instituted and the Mansfield sand reservoir was expanded during 1957 through 1958 to three times its original size before the productive limits actually were defined. A total of 45 wells was drilled and completed on 10-acre spacing. The method of well completion was the same in Springfield pool as it was in Caborn field.

Water-injection wells were selected on a five-spot pattern with 930-ft. spacing between like wells. Initial water injection was started in September 1955 in six wells. By June 1959 a total of 23 water-injection wells was placed in operation, completing the project.

Geology and reservoir characteristics. The Caborn and Springfield reservoirs produce from an anticlinal structure, which is the result

Brass Tacks

FROM HALLIBURTON

FRACTURING TREATMENTS

Bring Better Results Than Operators Thought Possible

Acidfrac makes good gas well from non-producer

Barber County, Kansas — Acidfrac switched this apparent non-producer into a 12,800,000 cu. ft./day gas well. The operator nearly plugged the well, but decided to try stimulation first. A 500 gal. treatment of Halliburton MCA (mud cleanout agent) upped production to 500,000 cu. ft./day. Encouraged, the operator followed with a 25,000 gal. 7½% Acidfrac treatment at 3,000 psi with 20,000 lb. of 20-40 and 10,000 lb. of 10-20 round sand. Result: a profitable producer making 12,800,000 cu. ft./day.

A "Dry" Hole until Sandoil treatment turned it to 480 BOPD Producer

Sweetwater County, Wyoming—Halliburton used an unusually high rate and volume when fracturing this apparent dry hole with the Sandoil technique.

Although Electric Log and Drill Stem Test were disappointing, a producing well a mile away influenced the operator to set casing. Perforations were made between 3,336 and 3,665 feet in the Mesa Verde sand. Statistics: two Halliburton HT-400 trucks, 36,000 gal. No. 2 diesel oil with one gal. Halliburton Hyflo per 1,000 gal. oil, 1/20 lb./gal. FL-2 low fluid loss additive, plus 28,800 lbs. sand propping agent. Results: 400 BOPD initial production on 24/64" choke, still flowing 170 BOPD four months after treatment.

Vis-O-Frac brings in well for 120 BOPD

Walthall County, Miss. — This Vis-O-Frac treatment broke through an apparent permeability barrier at 9,676 ft. A 500 gal. volume of MCA led the treatment which consisted of 20,000 gal. Vis-O-Frac (gelled light petroleum fluid) with 25,000 lbs. 20-40 sand. Production immediately after treatment was 120 BOPD which improved to 148 BOPD after four months.

Multi-stage Fracplan Turns Non-Producer into 2½ million cu. ft./day well

Walthall County, Miss. — Another operator in this area accepted Halliburton's recommended Fracplan to improve gas production from 9,606 to 9,628 section of the Tuscaloosa sand. A three stage Waterfrac job was performed using Perfpac balls as the Multifrac diverting agent. Each stage consisted of a 3,170 gal. pad volume followed by 7,200 gal. gelled lease salt water with WAC-8 low fluid loss additive . . . carrying 3,170 lbs. 20-40 sand and 550 lbs. 12-16 aluminum pellets. A month after treatment, the "non-productive" well was making 2.5 to 3 million cu. ft./day and 7 bbl. condensate/mmcf at 2,100 psi with further improvement expected to outperform offsets.

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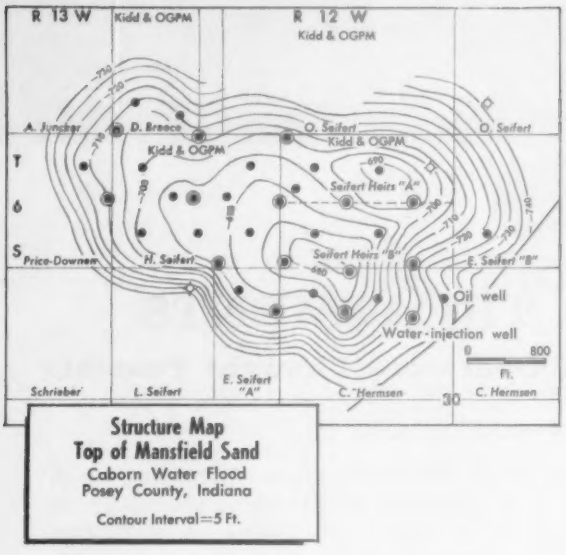


Fig. 1

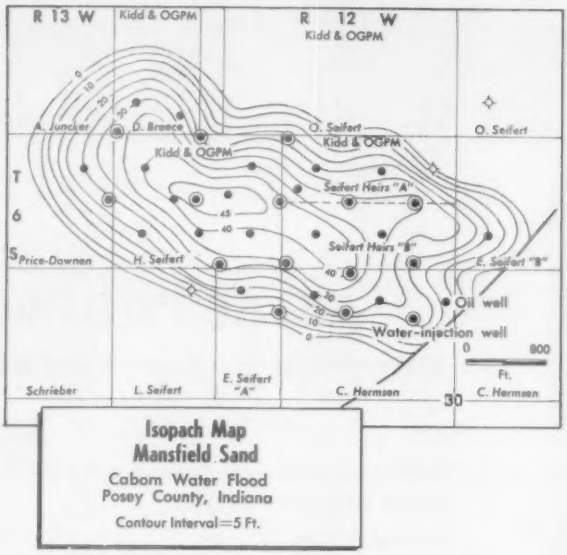


Fig. 2

of a sand buildup rather than an actual subsurface structure. Primary production from both reservoirs was by solution-gas drive. Edge water was present in a portion of each reservoir, but noneffective as verified by the daily rate of water production at the water-flood inception. In the Springfield reservoir edge water is present along the north limits of the flood, and along a portion of the north and west limits of the Caborn.

The Mansfield sand is clean and well consolidated in both reservoirs. The permeability variation ratio is in the order of 5 to 1 for the average well. This exceptionally favorablie sand condition is believed to be the principal reason for the water-injection efficiency.

Bases of performance predictions. Predicted water-oil-ratio performance curves were calculated by the Stiles method.

Estimated daily rate of oil production, Figs. 5 and 7, was based on previous experience for the average successful flood. Successful water floods generally reach a peak rate of oil production of approximately 50% of the daily volume of water injected. However, the Caborn flood had a peak daily rate of 75% of the water injected.

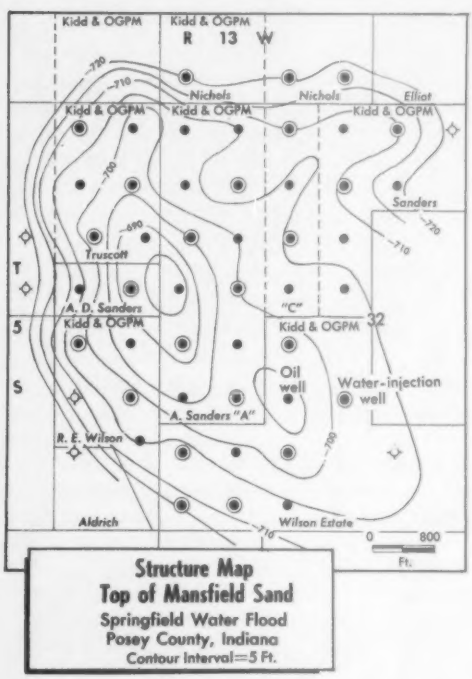


Fig. 3

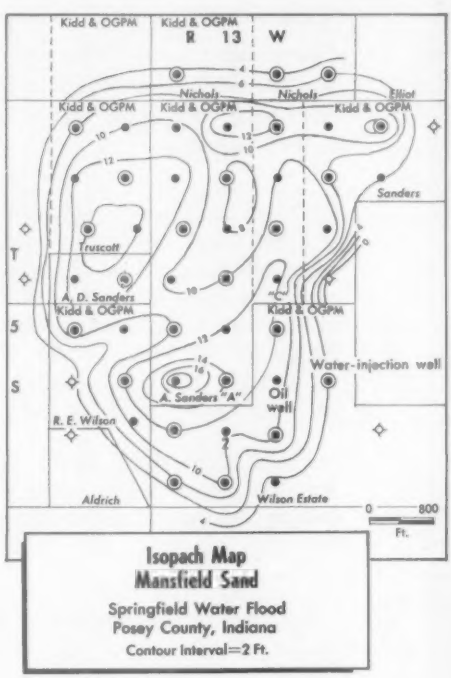
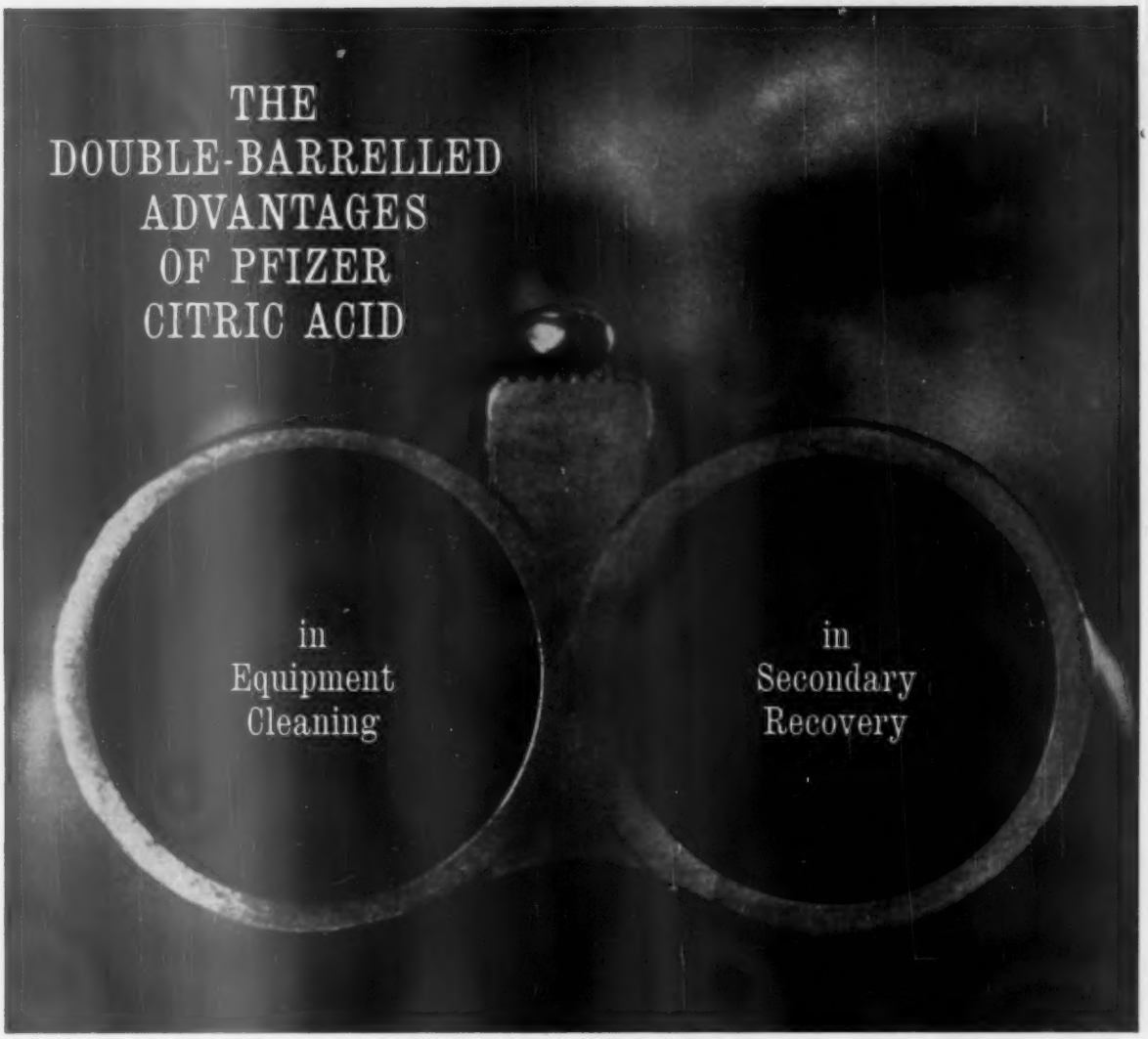


Fig. 4



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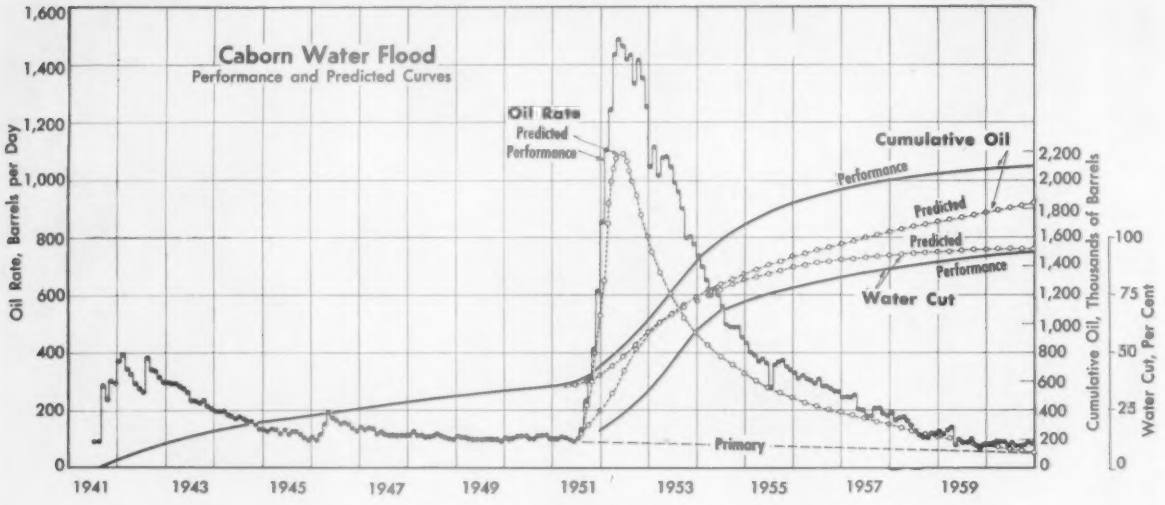


Fig. 5

Therefore, the predicted Springfield rate was based on experience obtained from the Caborn flood, but the efficiency was even greater, reaching approximately 100% of the volume of water injected.

The recoverable oil by water flooding was based on experience also, employing a stratification and sweep factor, residual-oil saturation before and after flooding, and a connate-water percentage value.

The percentage of connate water employed is significant in any reservoir calculation, which may be pointed out in these floods. An error in this determination would be reflected in other reservoir calculations. In Table 3 the connate-water determinations, obtained by the restored state and the flushed-by-kerosine method seem to be in appreciable difference since the reservoir characteristics are similar in other respects. Since this difference is present in the connate-water value it is reflected in the calculated residual-oil saturation after flooding. On the other hand, an error in finding the reservoir volume would also be reflected in the calculated residual-oil saturation after flooding.

We believe, however, that the restored-state method is more accurate in this instance than the flushed-by-kerosine method.

Caborn water system. Wood tanks are used for handling both raw and filtered salt water, but no chemicals have been added except to control bacteria. Initially aloxite filters were used, but the filtering method was later converted to a pressure-type system employing anthrafilt.

Plain steel line pipe was used for

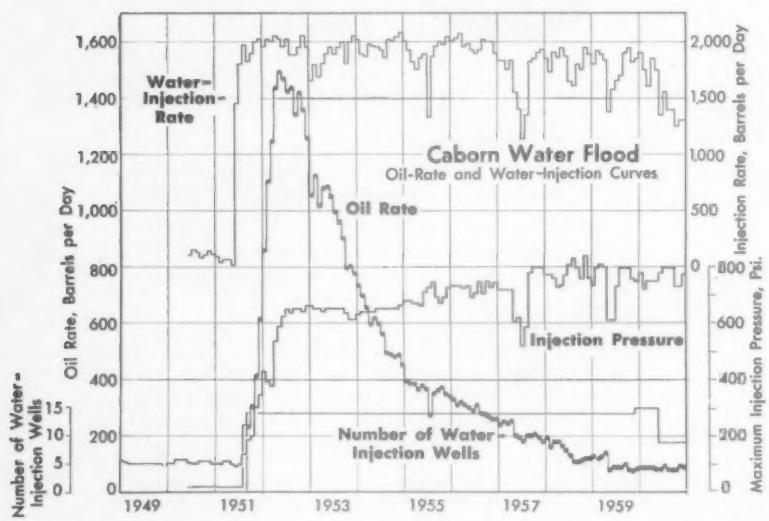
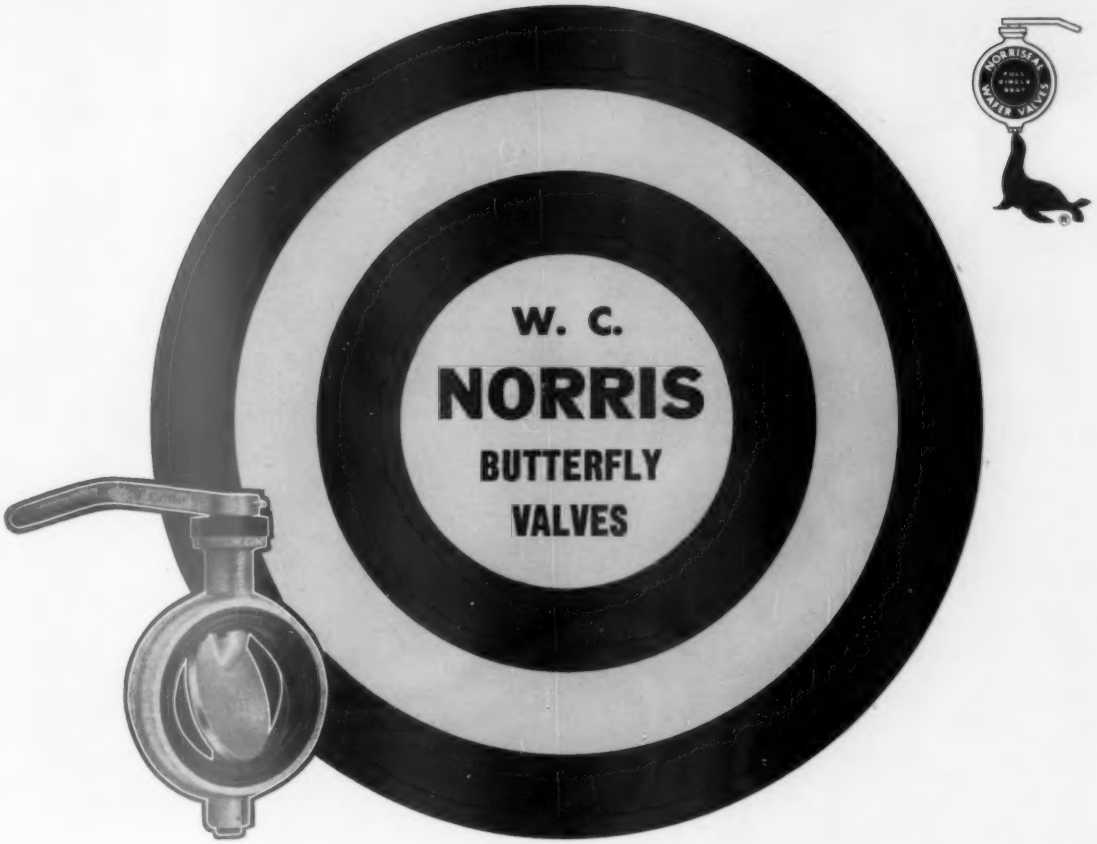


Fig. 6

Table 1—Oil-Recovery Data, Caborn and Springfield Water Floods, Posey County, Indiana

	Caborn Water Flood	Springfield Water Flood
Primary Area		
Recovery in barrels, Total	581,875	*573,780
Per acre	2,770	* 1,334
Per acre-ft.	120	* 131
Secondary Area		
Recovery in barrels, to 1-1-61	1,533,671	1,084,600
Total ultimate recovery	1,597,171	1,827,040
Per acre	13,312	5,190
Per acre-ft.	471	475
Recoverable Oil, Barrels Primary and Secondary		
Gross recovery, to 1-1-61	2,115,546	1,244,467
Estimated gross reserves	63,500	742,440
Ultimate gross recovery	2,179,046	1,986,907
Calculated Recoverable Oil, Per Cent of Oil in Place	60.7	59.1
Cumulative Water Injected, Barrels to 1-1-61	6,420,451	1,375,994
Barrels of Water Injected, Barrels of Oil Produced	4	1¼

*Estimated—Springfield water flood was expanded from the original primary area of 140 acres to 430 acres when completely developed.



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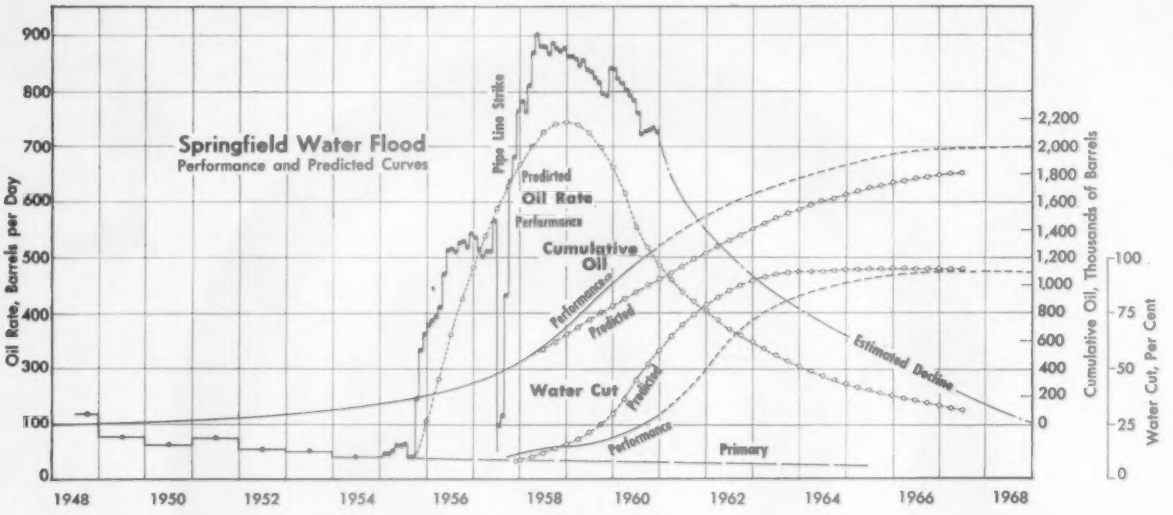


Fig. 7

both the water-injection lines and the produced-water return system. Corrosion was rather severe, so all replacements were either cement-lined pipe or plastic pipe.

Springfield water system. Initially a closed-type system with a pressure filter was used and an algaecide chemical was added for bacteria control in the fresh water. When it became necessary to dispose of the produced water, the system was converted to an open type, using a coagulant and other chemicals needed to aid the coagulant and control the bacteria.

Cement-lined pipe was used for both the water-injection system and the produced-water return lines.

Bibiliography

Province, John and Marquis, Duane, "Tubing-Handling Tools and Procedures": Petroleum Engineer, Oct. (1959).

Lubinski, Arthur, "Influence of Tension and Compression on Straightness and Buckling of Tubular Goods in Oil Wells": Proc. API, Sec. IV (Prod. Bul. 237), 31 (1951).

Oberg, C. H. and Masters, R. W., "The Determination of Stresses in Oil-Well Casing in Place: "Drilling and Production Practice, 257 (1947).

DeHetre, John P., "Casing-Landing Practices": Drilling and Production Practice, 34 (1946).

Lubinski, Arthur, "A Study of Buckling of Rotary-Drilling Strings": Drilling and Production Practice, 178 (1950).

Frazier, R. H., "Deterioration of Properties of Drill Pipe Through Use and Methods of Recovery": Youngstown Sheet & Tube Co., 1960.

Grant, R. S. and Texter, H. G., "Causes and Prevention of Drill-Pipe and Tool-Joint Troubles": Drilling and Production Practice, 9 (1941).

Texter, H. G., "Oil-well Casing and Tubing Troubles, Drilling and Production Practice, 7 (1955).

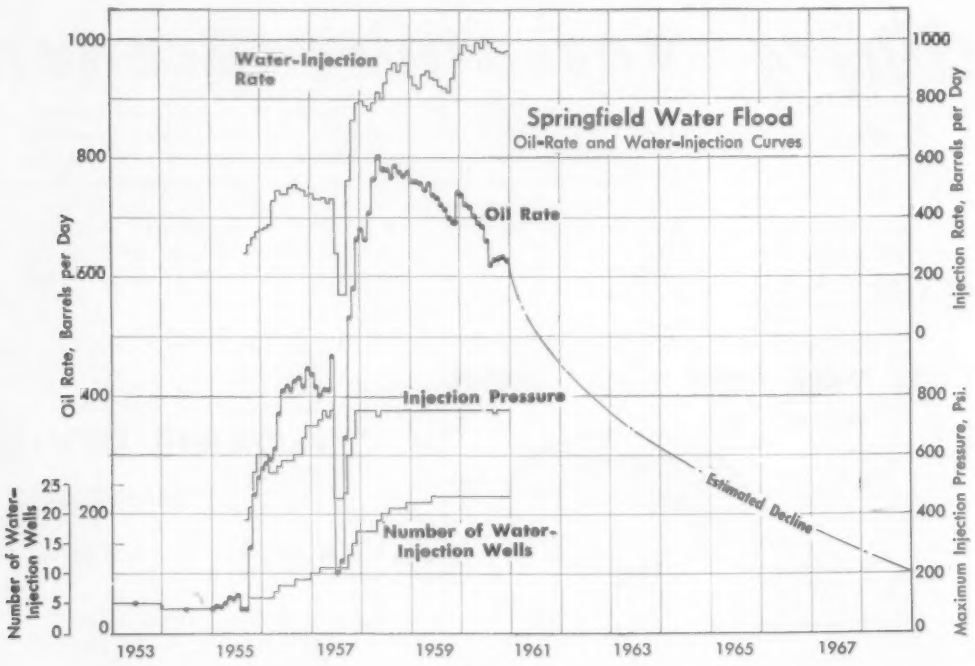


Fig. 8

Table 2—Field Data, Caborn and Springfield Water Floods

	Caborn Water Flood	Springfield Water Flood
Number Wells		
Oil	18	22
Water Injection	14	23
Well Spacing		
Primary Spacing, Acres	10	10
Secondary Spacing, Acres	5	10
Sand thickness in Wells Completed		
Avg. Thickness, Ft.	22	10
Max. Thickness, Ft.	46	19
Min. Thickness, Ft.	12	4
Daily Production		
At Water-Flood Inception		
Oil, bbl.	100	37
Water, bbl.	23	29
As of Jan. 1, 1961		
Oil, bbl.	92	618
Water, bbl.	1,300	232
Water-Injection Data		
At Inception		
Daily injection rate, bbl.	1,808	282
Number injection wells	12	6
Maximum		
Daily injection rate, bbl.	2,086	997
Number injection wells	14	23
Injection-Well Pattern	Five-Spot	Five-Spot
Distance Between Like Wells, Ft.	660	933
Number New Injection Wells Drilled	14	18
Number Oil Wells Converted to Water Injection	*4	5

*During 1960.

Table 3—Reservoir Data, Mansfield Sand, Caborn and Springfield Fields

	Caborn Water Flood	Springfield Water Flood
Planimetered Reservoir Volume		
Primary area		
Productive area, acres	220	430
Productive area, acre-ft.	4,845	4,380
Average sand thickness, ft.	22.0	10.2
Secondary (Water Flood) Area		
Acres	120	352
Acre-ft.	3,387	3,839
Average sand thickness, ft.	28.2	10.9
Gravity of Oil, °API at 60° F.	33.5	32.3
Viscosity of Oil at 73° F. cp.	9.4	9.1
Gas-Oil Ratio Cu. Ft. per Bbl. Initial, est.	165	175
Formation-Volume Factor, Initial, est.	1.08	1.09
Oil Saturation, Per Cent Pore Space		
Beginning of water flood, calculated	56.9	62.4
End of water flood, calculated	25.5	28.7
Core-Analysis Data		
Number wells cored and analyzed	18	45
Average porosity, per cent pore space	19.7	18.7
Average permeability, md.	183	104
Average residual-oil saturation (core), per cent pore space	34.1	38.6
Average total water (core), per cent pore space	40.1	43.6
Connate-water determination, per cent pore space	*31.2	†24.9

*Restored state determination. †Flushed with kerosine.

Table 4—Cost Data

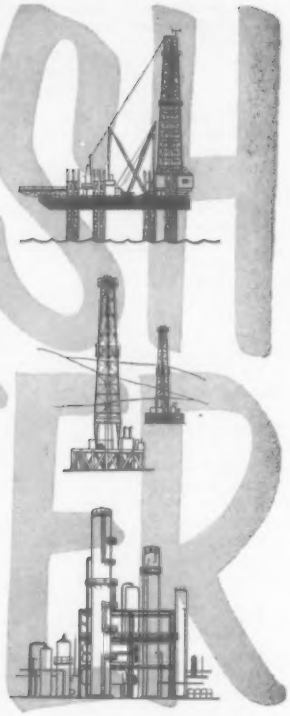
Caborn Water-Flood Costs	
Water plant and auxiliary equipment	$ 46,096
Development cost, including drilling and equipping additional wells	$111,764
Total Installation Cost	$157,864
Average cost of drilling and equipping a water-injection well	$ 6,500
Lifting Cost During Life of Flood	
Cost per gross barrel of oil produced	$ 0.642
Cost per net barrel of oil produced	$ 0.725
Springfield Water-Flood Costs	
Water plant and auxiliary equipment	$ 77,349
Conversions and workovers	$ 33,957
Additional development cost of expanding producing area	$429,179
Total Installation Cost	$540,485
Average cost of water-injection well, including lines and equipment	$ 12,000
Average cost of drilling and completing an oil-producing well, including lines, tank battery, etc.	$ 15,500
Lifting Cost During Life of Flood	
Cost per gross barrel of oil produced	$ 0.685
Cost per net barrel of oil produced	$ 0.835

TABLE 5—ECONOMIC ANALYSIS OF CABORN AND SPRINGFIELD WATER FLOODS

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Total
Caborn Water Flood											
Gross barrels	58,802	480,606	350,277	207,719	132,602	107,708	76,149	52,457	36,265	31,086	1,533,671
Net barrels to working interest	48,235	394,240	287,330	170,390	108,775	88,355	62,465	43,030	29,750	25,500	1,258,070
Oil sales, dollars	133,610	1,092,045	833,255	514,580	319,800	260,645	194,890	129,090	89,250	76,500	3,643,665
Crude price per barrel, dollars	2.77	2.77	2.90	3.02	2.94	2.95	3.12	3.00	3.00	3.00	.....
Operating cost, dollars	36,967	134,464	165,137	116,891	117,290	109,035	104,471	97,086	94,741	75,257	1,051,339
Installation cost, dollars	157,860	.....	.....	.....	.....	.....	.....	.....	.....	.....	157,860
Net revenue, dollars	(61,217)	957,581	668,118	397,689	202,510	151,610	90,419	32,004	(5,491)	1,243	2,434,466
Cum. net revenue, dollars	.....	896,364	1,564,482	1,962,171	2,164,681	2,316,291	2,406,710	2,438,714	2,433,223	2,434,466	2,434,466

	1955	1956	1957	1958	1959	1960	Total as of 1-1-61	Est. remaining after 1-1-61	Total
Springfield Water Flood									
Gross barrels	23,958	137,194	136,334	275,059	267,649	244,367	1,084,561	742,440	1,827,001
Net barrels to working interest	19,885	113,871	113,157	228,298	222,149	202,825	900,185	615,535	1,515,720
Oil sales, dollars	58,462	335,919	353,049	684,894	666,447	608,475	2,707,246	1,846,660	4,553,906
Crude price per barrel, dollars	2.94	2.95	3.12	3.00	3.00	3.00	.....	3.00	.....
Operating cost, dollars	27,049	46,051	50,073	98,412	93,565	78,692	393,842	580,000	973,842
Installation and development cost, dollars	74,945	69,225	207,690	188,625	.....	.....	540,485	.....	540,485
Net revenue, dollars	(43,532)	220,643	95,286	397,857	572,882	529,783	1,772,919	1,266,605	3,039,524
Cum. net revenue, dollars	.....	177,111	272,397	670,254	1,243,136	1,772,919	1,772,919	.....	.....

FRESH WATER



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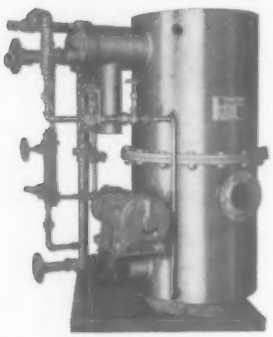

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IOCC completes new gas manual

Four and one-half years of effort on the part of some of the country's leading gas engineers have paid off in the completion of Interstate Oil Compact Commission's "Manual of Back-Pressure Testing of Gas Wells."

The project started with a recommendation made at the December 1956 IOCC meeting. A subcommittee was formed, and work was started (OGJ, Dec. 1, 1958, p. 123).

Relieve confusion. New manual should bring an end to the trouble caused by too many different manuals in use now. Each state having gas production has regulations covering gas-well testing, and the methods vary from one state to the next. Adoption of the new manual will mean that companies working interstate can use the same evaluation methods on all gas wells.

One source of confusion has been in the pressure bases adopted as standard by the different gas-producing states. These pressure bases run from 14.65 psi. in Texas, Oklahoma, Kansas, and North Dakota, to 14.73 psi. in California and 15.025 in New Mexico, Louisiana, Colorado, and Wyoming. The FPC has been using 14.73 also.

Two states, New Mexico and Kansas have published manuals in the past year or so, and a similar manual has been used in Texas for a number of years.

Preliminary printing of a limited number of copies of the new IOCC manual has been made so that any errors in the manuscript can be found. When needed corrections are made, the manual will be available for industry-wide distribution.

But there are copies available now. Lawrence R. Alley, executive secretary of IOCC said they can be had for the asking, but emphasized that all of these first copies should get into the hands of engineers that will use them. This is the best way to discover any typesetting errors.

There is no charge for these preliminary copies.

Cost of the final draft has not been set, but it will be nominal, according to Alley.

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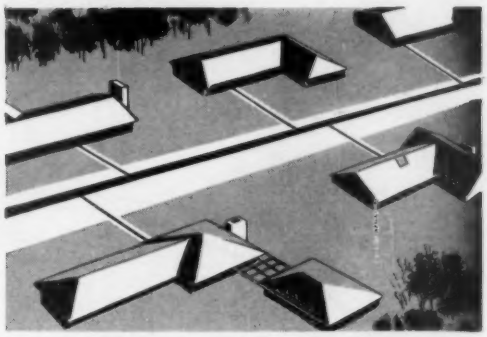

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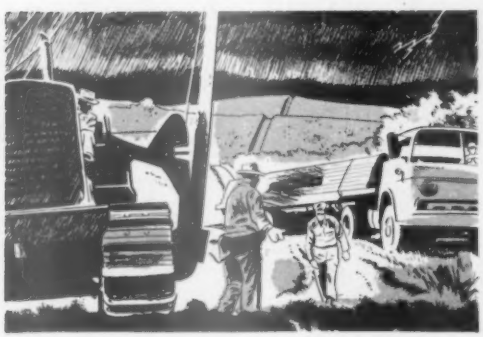

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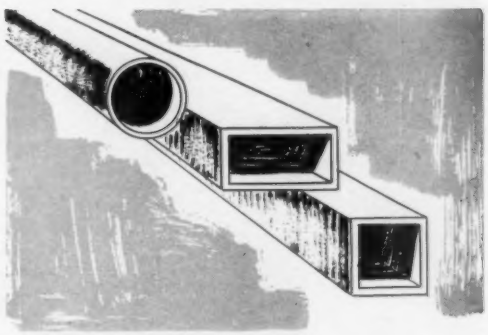

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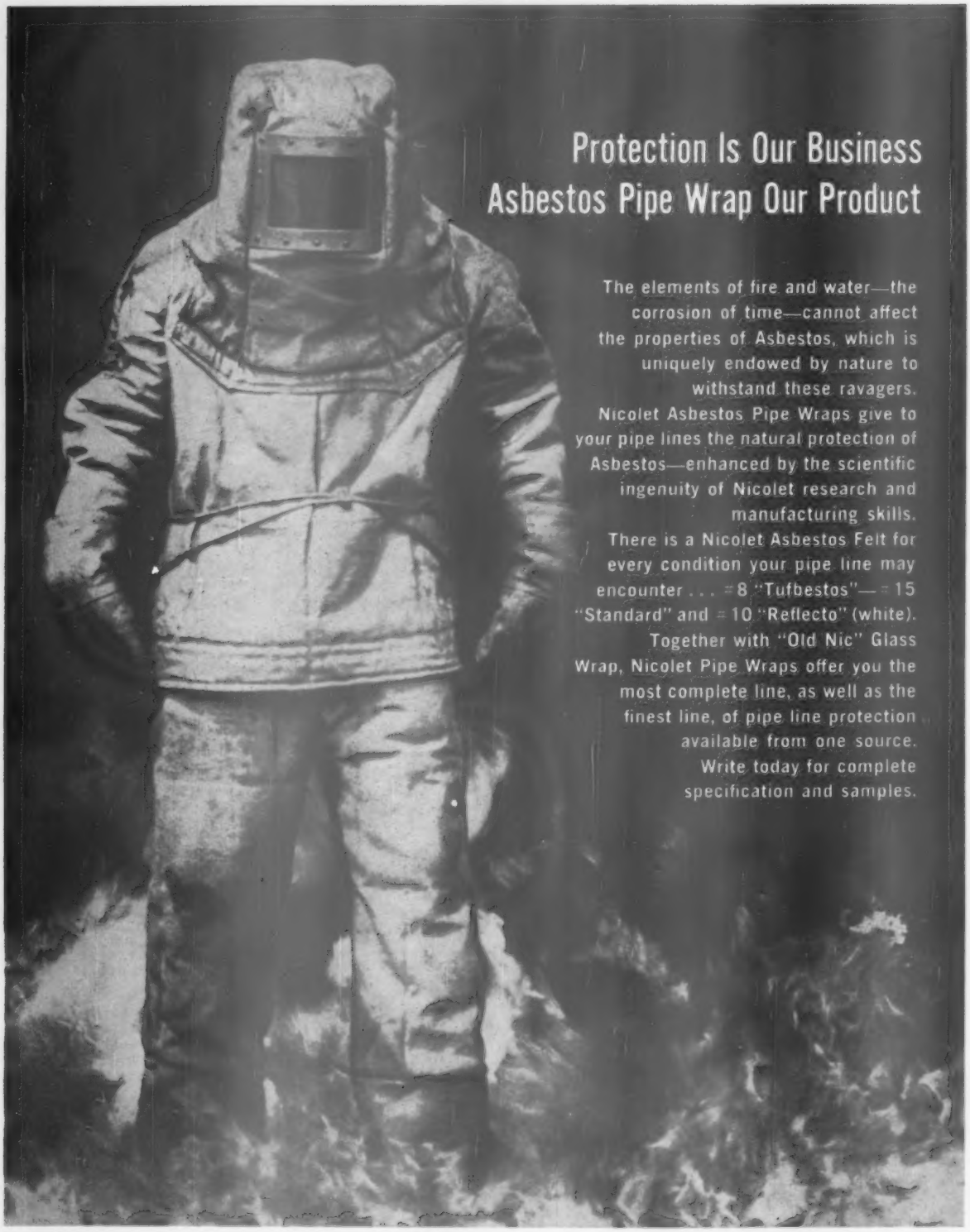

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TRENCHER IS TESTED for volume and pressure before pulling begins. Eight ¼-in. jets direct as many streams at 1,700 psi.

River crossing "jetted" in 1½ hours

BY JOHN P. O'DONNELL
Assistant Pipeline Editor

AN 8-IN. gas line has been laid across the 600-ft.-wide Cimarron River in an hour and a half at 40% of the budgeted cost. This feat was performed by a jet trencher which digs the trench and lays the pipe simultaneously.

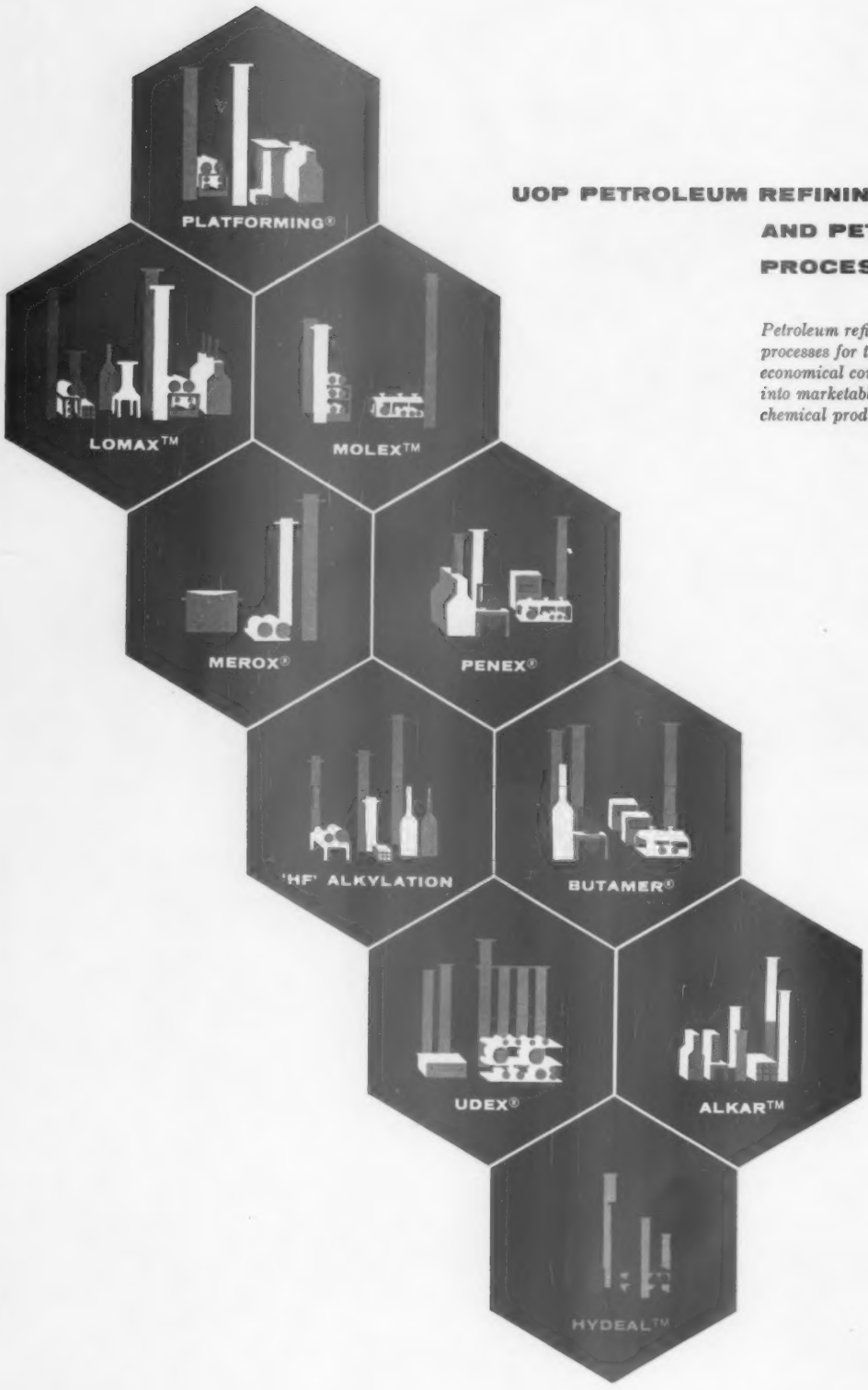
The line was laid for Oklahoma Natural Gas Co. by George W. Davis Construction Co., of Oklahoma City. It is part of a gathering system in Major County, Oklahoma. George W. Davis, president of the contracting firm, designed and built the trencher.

The trencher is pulled across the river by cables attached to bulldozer winches. Its cutting blade tapers from a knife edge to a 14-in. base. Eight jets are mounted on the blade, four on either side. Water pumped through the jets at 1,700 psi., digs the trench ahead of the blade as the trencher is pulled across the river. The jets are ¼-in. hydraulic nipples.

Rate of travel. The trencher traveled at the rate of 7 ft. per minute and completed the actual crossing in approximately an hour and a half. The entire operation, including the setting up of the equipment, took less than 2 full days for the 15-man crew. Normally a job of this size would take at least a week and probably two.

The trencher is triangular in

THE FULL 815 FT. is welded into a single string, coated, and wrapped before sideboom tractors begin easing line into approach trench.



UOP PETROLEUM REFINING AND PETROCHEMICAL PROCESSES

Petroleum refining and petrochemical processes for the efficient and economical conversion of petroleum into marketable fuel and chemical products.

produce high-grade benzene with Hydeal™

HYDEAL, a new process for the catalytic hydrodealkylation of toluene or xylenes, produces benzene of exceptional purity. Hydeal is also efficiently employed in the production of naphthalene from higher-boiling alkylnaphthalenes.

Hydeal serves a unique marketing need in petrochemical processing. Toluene, xylenes and heavier aromatic mixtures can now be efficiently and profitably converted to higher valued nitration-grade benzene. Benzene market demands by 1968 are expected to grow to more than three times those of toluene and xylenes. Hydeal is ideally suited to meeting this projected growth in benzene demand.

Exceptionally efficient, the Hydeal process, jointly developed by Ashland Oil & Refining Company and UOP, provides excellent yields and operates at economical utility requirements. Benzene yield from the hydrodealkylation of toluene is over 90% of theoretical, while that from xylenes is over 85% of theoretical. Moderate in capital costs, Hydeal offers refiners a ready use for excess toluene and xylenes.

UOP offers a wide range of petroleum and petrochemical processes to refiners everywhere in the free world. A variety of technical sevices is also available to assure the profitable performance of these processes. Let us evaluate your processing needs now.

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MEANS PROGRESS TOMORROW

UOP

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U.S.A.

. . . one of a series presented by Western Supply Company, Tulsa, to improve the "I.Q."* of engineers . . .

BUYER-SELLER "ALLIANCE" IMPORTANT TO ENGINEERS; ORDERS ARE BORN OF CONFIDENCE

It is oftentimes surprising to the engineer that in the course of his career, if it is to be a rewarding one, he will be required to develop talents of both selling and buying. To put it simply: *either you have sold or you have been sold every time you talk to someone.* If you haven't closed your mind, you will often be sold. If you are competent to do so, you will just as often sell someone else.

Selling and buying processing equipment is a highly developed field, but essentially it consists of buying and selling ideas. As your career advances into supervisory, management, and executive functions, you will be called on to exhibit greater buyer-seller abilities. Buying and selling, directly or indirectly, are the heart and pulse of your company's business activity.

Most buying in industry involves from three to six individuals. Although the purchasing agent will be a key factor in all purchasing, almost all purchases in technical fields require the technical assistance of someone outside the purchasing department.

An industrial buyer, whether he is a purchasing agent or an engineer, is *human,* and is responsive to the same human values that you are when you buy a car or a suit of clothes. The industrial purchaser, though, is keenly aware of the plant and organization for which he buys. He is conversant with the product needed, and with its ultimate use.

The purchaser's objective is to procure the right equipment or material, of the right quality, in the right quantity, at the right time, from the right source, and at the right price. In accomplishing this he actually becomes a "salesman-selling-a-salesman."

In modern business the purchasing department should be a profit-making department. A four per cent savings in purchase costs, for instance, might be equal in profits to a 20 per cent increase in sales volume. Considering that the average industrial firm spends about 50 to 60 cents of each sales dollar for purchases, purchasing savings can easily represent the margin of profit.

In one large steel company, costs of products and services bought exceeds four million dollars for each working day. The variety of products bought is in the tens of thousands and these are purchased from nearly 50,000 suppliers. Obviously there is terrific opportunity for savings in the art of purchasing.

FOOTNOTE: These are the opening paragraphs of Western's latest "professional advancement" series, Booklet E-10, entitled "Buyer-Seller 'Alliance'; Important to Engineers". Your copy is free upon request. Write to Western Supply Company, Heat Exchanger Division, P.O. Box 1888, Tulsa Okla.—where "buyer-seller" relationships are important in the delivery of quality-design heat exchangers.

HEADER OF 2-IN PIPE, with quick-opening valves, supplies water through short lengths of hose and vents in plug section.

shape with a vertical cutting blade. The base, in this instance, was 8-in. pipe, the same diameter as the line to be pulled, and about 15 ft. in length. Space between walls, on either side from the blade to the base, is filled with silt and sand as the trench is dug. This helps to hold the line down.

Planes, with a rising forward edge, extend from either side above the blade. These ride on the river bottom and are designed to keep the blade in a vertical position. The hitch for the cables to the bulldozers is just above the blade. A 2-in. riser on top of the assembly tells the operators the position of the trencher when it is submerged.

Welded to trencher. The full length of the line to be pulled was 815 ft. The leading end was welded to the pipe at the base of the trencher. A plug, 15 ft. 8 in. of 8-in. pipe, was welded to the other end of the string. The plug was equipped with two vents to admit the water.

Water was taken from the river and pumped into the line through a header by two Halliburton trucks. The 2-in. stationary header was laid the full length of the string. It was equipped with quick-opening valves every 100 ft. As the line was pulled into the river these were opened and

DITCH HAS BEEN DEEPENED so that trencher begins travel at desired depth. Two-inch riser shows its location when submerged.

H. J. Etchison, District Superintendent for the Northern Illinois Gas Company, and Koppers Serviceman A. C. Hueseman, check Bitumastic coating on pipeline project near Belvidere, Illinois.

"It's a real help to have a coatings serviceman on the job!"

That's the way H. J. Etchison, District Superintendent for Northern Illinois Gas Company, summed up Koppers Serviceman A. C. Hueseman's role on the company's new 22 inch gas line in Illinois between East Dubuque and Des Plaines.

"A serviceman brings expert assistance to the men on the job," Mr. Etchison said. "It saved us time and money having a specialist on the spot to tackle unexpected coating problems. We've found that servicemen have solved most of these problems on other jobs and they're able to anticipate possible trouble spots in advance."

Northern Illinois Gas Company's new line delivers gas from a supplier into its system serving suburban Chicago. It is typical of installations where serviceman Hueseman has helped gas companies with the application of high quality Bitumastic® Enamels. And his travels have carried him across the nation so many times that, as he says, "almost anywhere is home."

A Koppers field service specialist can help you get the most for your corrosion-prevention investment. For more information on the proved performance of Bitumastic pipeline coatings, mail the coupon or write: Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pennsylvania. District Offices: Boston, Chicago, Los Angeles, Pittsburgh, New York, Woodward, Ala., Houston, Texas (Mavor-Kelly Company). In Canada: Koppers Products, Ltd., Toronto, Ont.

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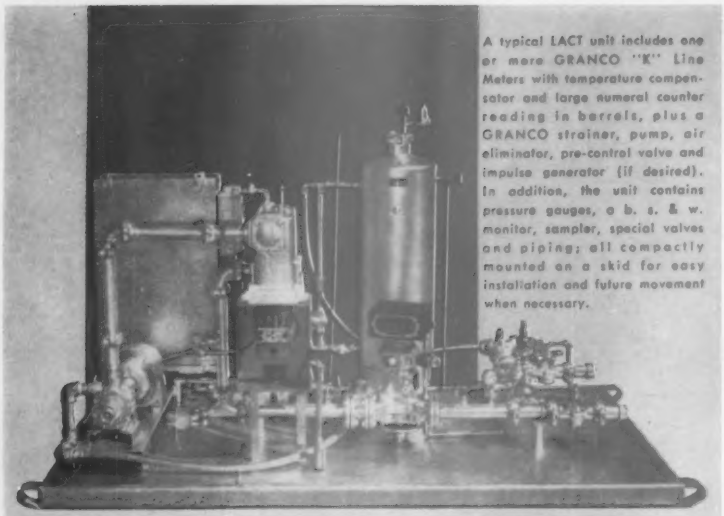
another fine product of COAL TAR

KOPPERS COMPANY, INC.
Tar Products Division
Dept. 104H,
Pittsburgh 19, Pa.
Gentlemen:

I would like a copy of your booklet on pipeline coatings, "How Long Should A Pipeline Last?"

Name_____ Title_____
Firm_____
Address_____
City_____ Zone____ State_____



A typical LACT unit includes one or more GRANCO "K" Line Meters with temperature compensator and large numeral counter reading in barrels, plus a GRANCO strainer, pump, air eliminator, pre-control valve and impulse generator (if desired). In addition, the unit contains pressure gauges, a. b. s. & w. monitor, sampler, special valves and piping; all compactly mounted on a skid for easy installation and future movement when necessary.

GRANCO

LACT *UNITS*

"on stream"

pay off in accuracy...dependable,

trouble-free performance

LACT producers use volume measurement as the basis for dollar evaluation of crude-oil custody transfer. More and more, producers large and small are specifying GRANCO positive displacement metering systems. These modern, 5-blade, rotary type positive displacement meters provide smooth, non-pulsating operation with unparalled accuracy over the complete flow range. Ruggedly constructed and specially designed for LACT operations, they require little or no maintenance.

In the Texas panhandle and Midland-Odessa area, GRANCO equipped LACT units are installed on most major pipelines. Here, for measuring sour crude, GRANCO meters are supplied with iron internals and treated with a protective coating to assure trouble-free performance.

For complete details on GRANCO equipment and skid mounted LACT units, consult your local GRANCO distributor.

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GRANCO PRODUCTS DIVISION

BUFFALO METER COMPANY, INC.

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1308 67TH ST., OAKLAND 8, CALIFORNIA

SALES AND SERVICE REPRESENTATIVES THROUGHOUT THE NATION

closed and hoses were switched from section to section successively to maintain a constant pressure. Between the weight of the water and ½-in. wall thickness of the pipe, there was ample weight to hold the line down.

Four D6 Caterpillar tractors on the opposite side of the river were used in a similar fashion. Each was capable of handling 200 ft. of the 900-ft. cables on its winch. Two pulled simultaneously and, when their limit was reached, the other two took over. By leapfrogging, they maintained a constant pull on the trencher.

Before the line was pulled into the river, it was filled with water and the jet action was tested. After the crossing was completed, a squeegee pig was sent through the line in a matter of minutes to remove the water.

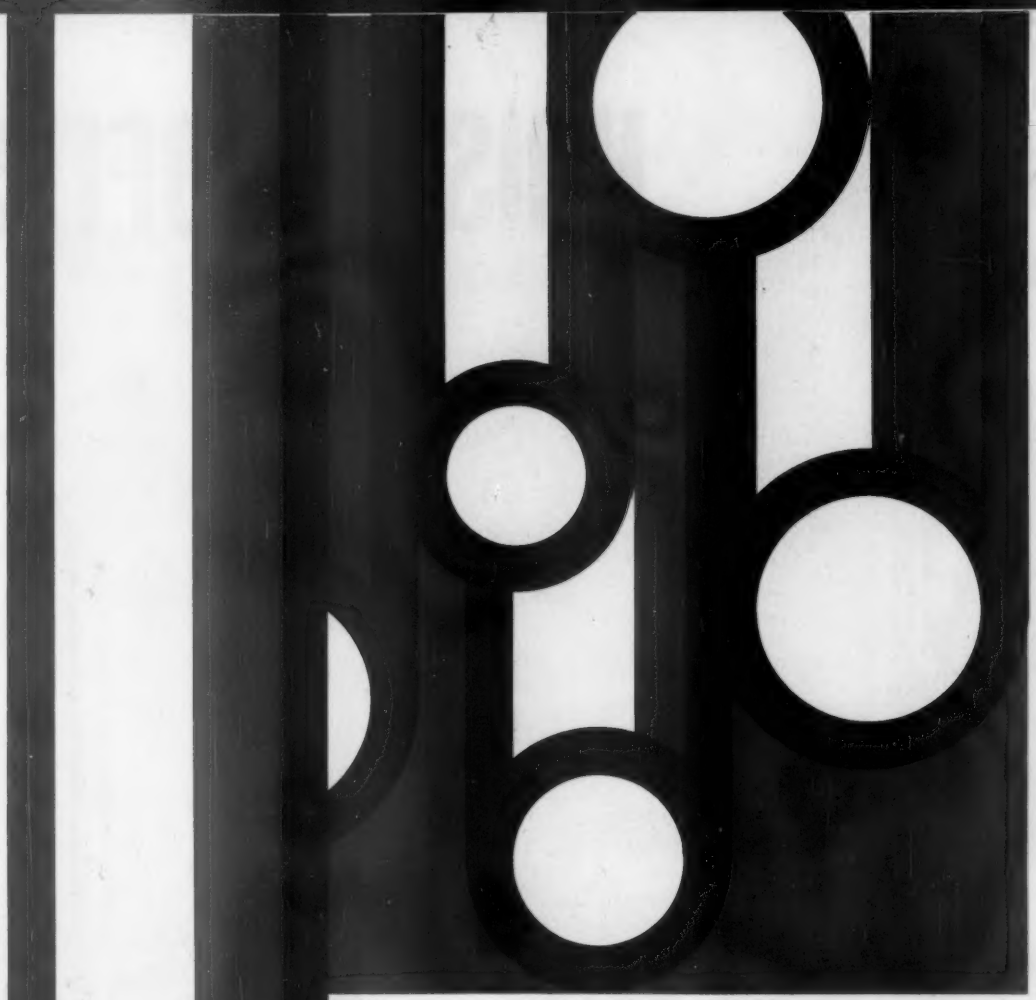
Four-foot cover. While the contract specified a 3-ft. cover, the actual depth of the covering was a good 4 ft. The pipe was coated with coal-tar enamel and wrapped with kraft paper. Despite the pulling, there was no apparent damage to the coating.

Preparations for the operation included the assembling of equipment; laying the header, which was done the day before the pulling; and digging the approach trenches. Equipment included a backhoe to dig the approach trench, two sideboom tractors to ease the pipe into the river, the four tractors to pull the line, and the two Halliburton pump trucks.

Before the trencher was put in place, the trench on the river side of the approach was dug deep enough to get the trencher started at the desired depth. Rain, which fell during most of the operation, did not deter its progress.

The Cimarron, at this point and at the time the operation was undertaken, was not over waist deep. While the distance from tie-in to tie-in was 816 ft., the stream was only 600 ft. wide.

Davis developed the device in his own shop. A model, scaled 1 in. to the foot, was assembled and tested there before the first full-scale unit was put together. It weighs an estimated 3,000 lb. He has applied for patents and intends to make the trencher generally available.



For the Progress of Economy and Civilisation

new supply systems made of steel tubes are installed all over the world. Just as indispensable the steel tube has become as structural element.

During the last fiscal year, PHOENIX-RHEINROHR produced approx. 750,000 tons of seamless and welded steel tubes for all fields of application.

- Pipe lines of all sizes for water, gas and oil
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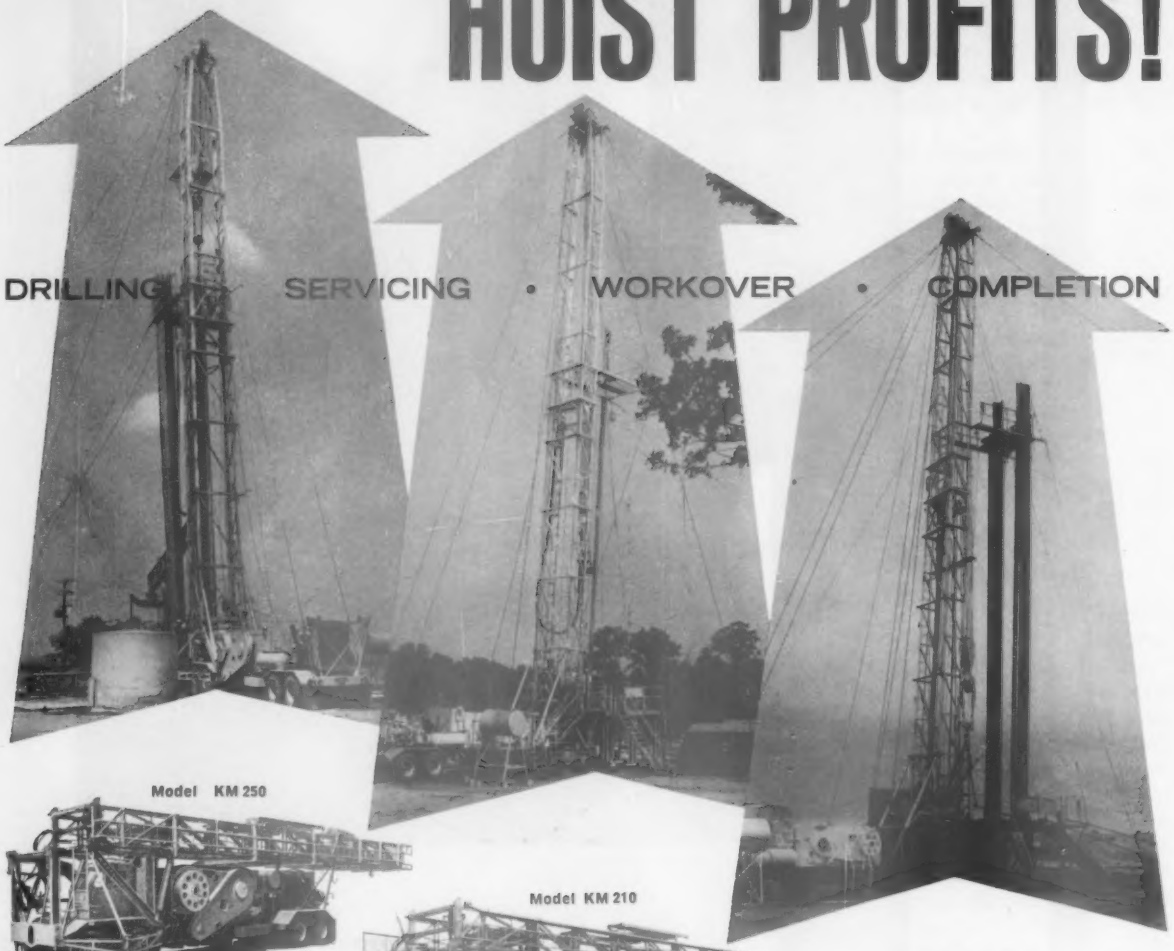
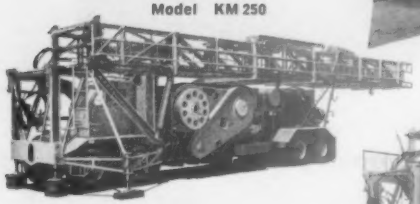


Model KM 250



Model KM 210

Model KM 200A

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Keep profits up! Hold on to good crews! Keep equipment busy! You can do all these things —even in slack times—if you have versatile equipment that lets you do all kinds of jobs.

Cardwell KM210 and KM250 rigs are tailor-made for times like these. They are ideal for medium depth drilling or servicing and work-over to 15,000 feet. Being drive-in units, they move fast, rig up quickly, get the job done fast and then get on to the next location. This is particularly true if you also use a Cardwell engineered substructure.

Your costs are low and your profits are high when you use Cardwell iron. Let us give you the full story on these modern Cardwell Drive-in Rigs.

for tomorrow's equipment—see Cardwell today!

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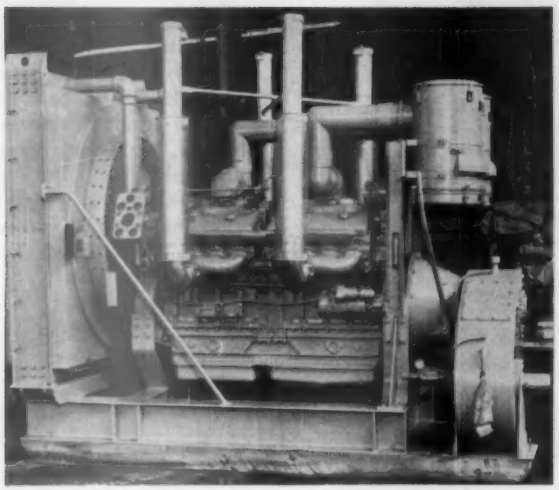
What's NEW . . . in equipment



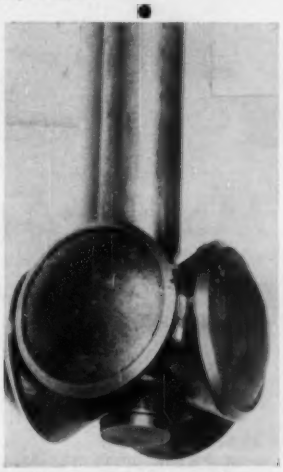
430-to-688-hp. diesel power unit for air-drilling compressors

HEAVY-DUTY portable air compressors used in air drilling can be conveniently powered with this new diesel power unit. The engine is equipped with a high-capacity radiator cooling system designed to permit operation under sustained high loading at ambient temperatures up to 120° F. Another valuable feature, particularly in extremely dusty areas, is a dry type of air cleaner. Still another feature is the torque arm drive that provides a compact reduction ratio between the engine and the compressor. Source: **Stewart & Stevenson Services, Inc.,** P. O. Box 1637, Houston, Tex., U.S.A.

Nodular iron gears featured in pump-jack speed reducer

NODULAR IRON, a material that reportedly withstands rough use, is used for the gears in the speed reducer in the Series E pump jack now available. Other design features of interest in the jack include split-hub type of cranks that give full floor clearance.

The stroke adjustment is obtained by varying the position of the upper pitman bearing on the walking beam. Source: **Jensen Bros. Mfg. Co., Inc.,** 922 14th, Coffeyville, Kans., U.S.A.



Multijet perforating device

Where large-diameter holes in a single plane present distinct advantages, a new expendable, radial-firing, multijet perforating device may give the solution. Location of the perforations in a single plane is said to promote horizontal fracturing when hydraulic force is applied. Experience indicates that the large diameter holes reduce horsepower

Need more facts on the items described on these pages?

The manufacturers will gladly supply them. They're shown in bold type, with their addresses. For convenience, send this coupon to the manufacturer.

ITEM _____

_____

OIL AND GAS JOURNAL

August 7, 1961

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____

TRANSWESTERN PIPELINE COMPANY
MEASUREMENT DEPARTMENT
SULPHUR DETERMINATION TEST REPORT

Company or Producer: TW PL Co. Date: 7-5-61
Field or Location: Contract Number:
Source or Reservoir: Eaton Field & Res. No.:
Well or Station Name: Eaton Station Number:

Analysis of gas for H_2S, RSH, RSR & RSSR using Austin Titrator

Bromine titration results expressed in milliamperes generating current required to maintain a fixed level of free bromine in the generating cell during selective scrubbing processes. Gas flow set at 500 cubic centimeters per minute.

Test Data

A. Blank (filtered sulphur free gas)	.080 ma.
B. Total Sulphur (unscrubbed gas)	1.036 ma.
C. H_2S removed (selective scrubber)	.865 ma.
D. H_2S & RSH removed (selective scrubber)	.373 ma.
E. H_2S, RSH & RSR removed (selective scrubber)	.175 ma.
A' Blank rerun (If A' ≠ A, rerun)	.080 ma.

Calculations

Sulphur Derivative		Equation	Grains/100 CF
H_2S	Hydrogen Sulfide	.52 x (B-C)	.089
RSH	Mercaptans	.44 x (C-D)	.216
RSR	Sulfides	.90 x (D-E)	.178
RSSR	Residual Sulphur	.50 x (E-A')	.048
	Total Sulphur		.531

Remarks:
Analysis By: D. J. Roberts Witness by:
FORM TW-240

Maloney-Crawford solves Another sour gas problem

TRANSWESTERN PIPELINE CO.'S PROBLEM: An 18 MMSCF/D stream with 100 grains H_2S/100 CF.

THE REQUIREMENT: Reduce H_2S to .25 grains/100 CF to meet pipeline specifications and dehydrate gas to 6.5 pounds H_2O/MMCF.

M-C'S SOLUTION: An automated Sweet-A-Mine gas treating plant with ratio-rate control system and a DU Series glycol dehydrator.

THE RESULT: The Sweet-A-Mine reduced the stream's H_2S content to .089 grains/100 CF, the actual Transwestern field report shown above verifies. The dehydrator met the water extraction requirements with ease.

CONCLUSION: If you have a sour gas problem, send it to M-C. You'll get an authoritative solution.

Maloney-Crawford

Designers and Manufacturers of Processing and Production Equipment

Box 659 Tulsa

losses and lower formation breakdown pressures compared to small-diameter perforations.

The perforator consists of a cluster of shaped charges contained in a frangible cast-iron case that shatters into small pieces upon being fired. The perforator comes in three sizes for casing diameters from 4½ to 7 in. Maximum operating pressure and temperature, respectively, are 10,000 psi. and 300° F. Source: **Schlumberger Well Surveying Corp.**, Box 2175, Houston, Tex., U.S.A.

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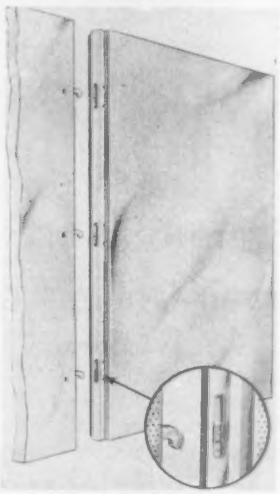

Panel to reduce plant noise

The noise level in plants and pumping stations may be kept low through the use of a new line of acoustic panels now available that are of modular construction. They can be used as sound barriers and enclosures.

The Series 10 Noiseguard panels have an over-all thickness of 1 in. and consist of a fire-retardant, self-supporting acoustical core sandwiched to sheet metal.

A number of noteworthy features are cited for the panel. Their acoustical core reportedly has enough structural integrity to eliminate the need for stiffeners that can act as "sound bridges," or heavyweight steel casings to reduce noise.

The sheet-metal surfaces are rendered acoustically "dead" by means of a visco-elastic sound and vibration-dumping coating which is claimed to stop resonant responses of the panel.

Latch-locks operated by the twist of a key join adjacent panels together with enough force to provide

FIRST...

SECURITY'S EXCLUSIVE

NAIL LOCK*

FOR JET BIT NOZZLES!

SECURITY does it again! The newly developed, exclusive nail-lock for retaining jet nozzles, is unmatched in the industry. This years-ahead design eliminates undependable, old-type snap ring retainers. The nozzle can't come out!

Plus feature: Nail is easily removed to change nozzle sizes. Less down time is assured because of deleting old-type snap-rings which are often lost through erosion . . . faster hole results!

Write today for data sheet on this new pin-retainer . . . another Security First for jet bits!

*Patent pending

Security® ENGINEERING DIVISION
P. O. Box 13647
Dallas, Texas
And Manchester, England

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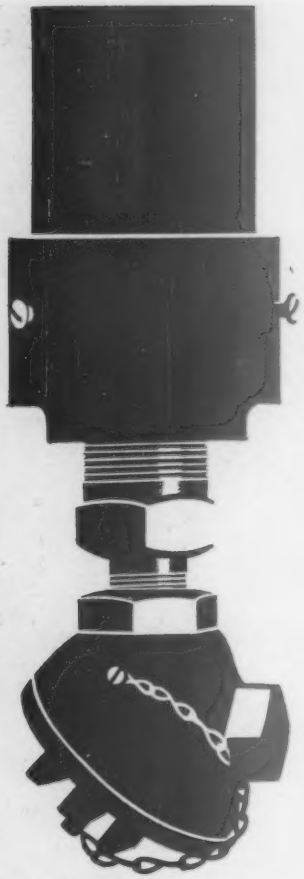

THERMOCOUPLE COMPONENTS

Wires, insulators, protecting tubes, heads, blocks, connectors and miscellaneous components—supplied in countless combinations, for highest possible accuracy in any given application. Thermocouple components are among many thousands of accessories—all available from a single dependable source—that can help your instruments perform at their very best.

Get complete details from your nearby Honeywell field engineer, or write today for Catalog G100-3.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

First in Control

SINCE 1906

a positive seal and to prevent noise leakage. This fastening method is also said to permit simple and rapid enclosure assembly and demounting without loss of acoustical properties. Source: **Korfund Co., Inc.,** Cantiague Rd., Westbury, N. Y., U.S.A.

•

Newest wellhead regulator

An intermitting condensing regulator for well heads can be used with a positive choke to form a fluid seal in a well and thus hold gas in the formation, the maker says. The tool is described as being nonfreezing and nonsurging. It is installed in the line at the christmas tree. Installation reportedly takes only about 15 to 30 minutes. Source: **Gas Oil Ratio Control Co., Inc.,** Box 65, Galena Park, Tex., U.S.A.

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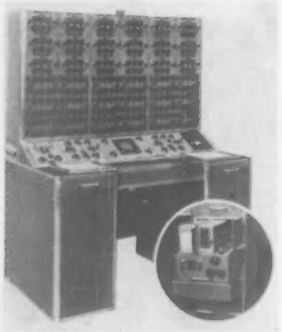

General-purpose analog computer

Accurate recording of both repetitive and continuous operation is provided by a general-purpose computer that has been developed. The computer may be set up to represent the electrical equivalent, or analog, of a physical system or a mathematical equation. When a particular problem has been established, the computer will provide a graphical solution, either in the form of a trace on a cathode ray tube or a graph on a paper chart.

No specialized electronic knowledge is required, the maker says, to operate the computer. It will deal with both linear and nonlinear systems. A single console will solve

MARTIN RUBBER & DUCK RINGS give excellent life in dirty abrasive fluids . . . high or low gravity . . . much or little water . . . shallow or deep wells. They last for years in the easier pumping wells. Replacement rings cost comparatively little.

MARTIN PLUNGER BODIES, precision grooved, drilled and threaded (no underneath fluid passage), usually last for years. Tube or barrel costs are often cut in half.

The replaceable SYNTHETIC RUBBER GUIDES in MARTIN CAGES last longer than any metal, and the cushioning of the ball increases your ball & seat life. Results are often truly amazing. (Patent No. 2,591,174)

Write for our new catalog or see it in the Composite (24th Edition). All products sold thru supply companies.

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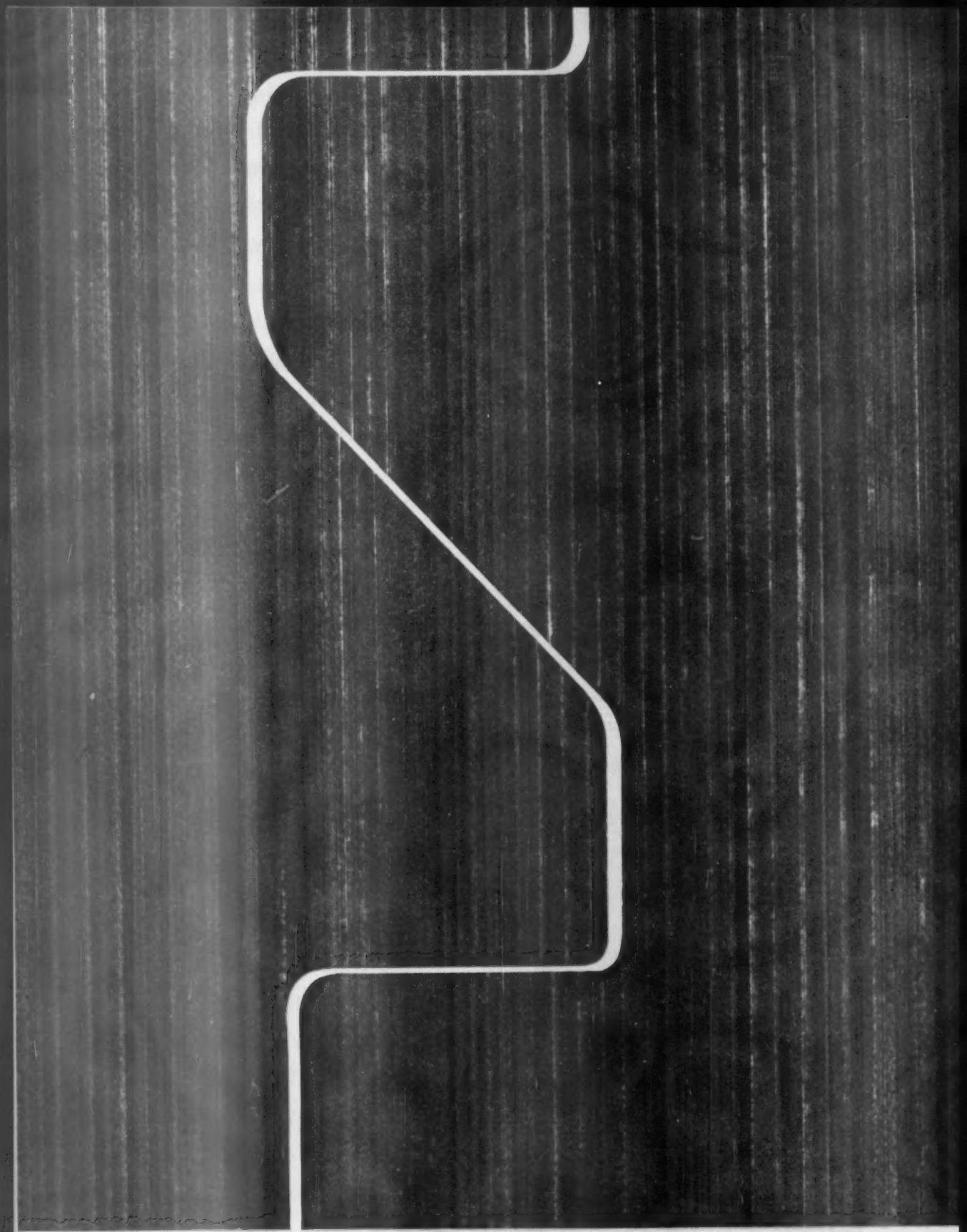
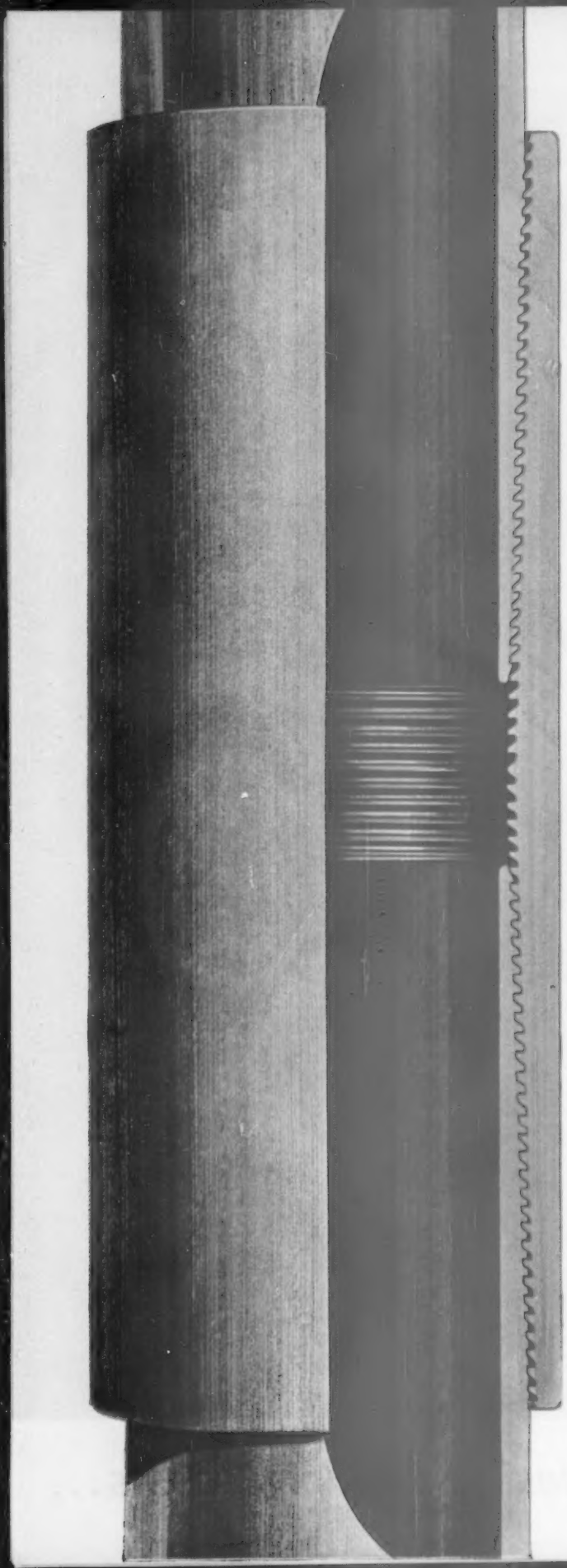


This advanced thread design cuts pipe costs...



Until recently, oil country casing and tubing had utilized upset ends to strengthen the joint for deeper wells. But this joint thickening meant a loss of valuable space within the casing—space that's more important than ever with the trend toward more multiple completion wells and slim hole wells.

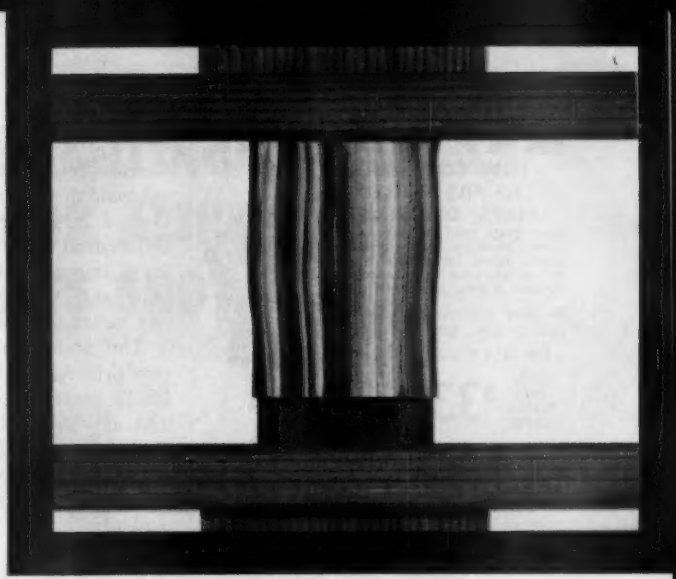
National Tube has developed a non-upset joint—the cost-saving USS National Buttress-Thread joint. The unique run-out design and flank angle of the Buttress-Thread gives pipe all the strength it needs. In fact, the joint strength is comparable to that of the body of the pipe. The Buttress-Thread eliminates the need for the internal upset in casing, as well as the external upset in tubing. Now there's maximum hole clearance, and multiple tubing strings can be run with minimum interference.

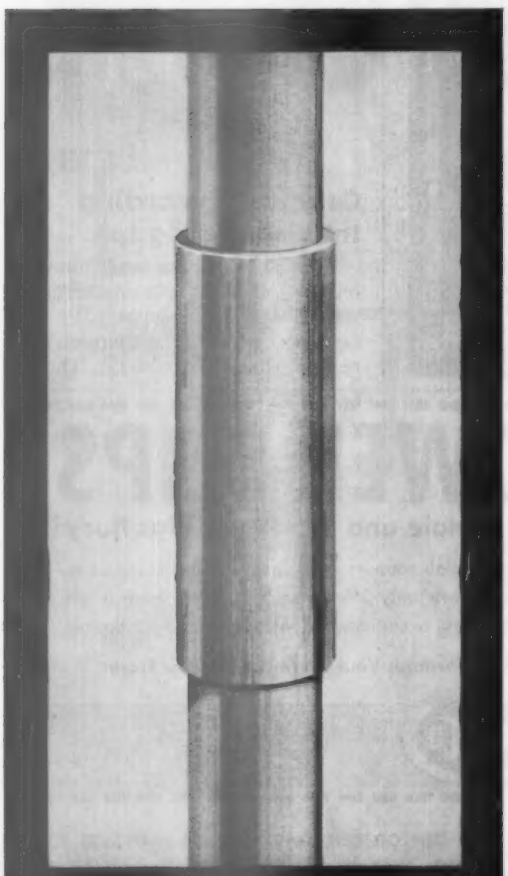
To prove the exceptional strength of the Buttress-Thread casing joint, National Tube engineers drove pipe nipples into the coupling until the threads tore loose. Despite this brutal pounding, the coupling did not

fail—the joint remained intact.

The latest adaptation of the Buttress-Thread is to oil well tubing. USS National Buttress-Thread tubing can be readily stabbed firmly into a coupling without thread damage or cross threading. Mill tests show joints can be made up and broken at least 12 times without thread damage or impairment to joint performance. Make-up time is faster because the pipe slips easily into the coupling, and engages immediately. Then 2½ turns make the joint gas-tight.

The coupling threads are heavily tin-plated so gas won't leak even at pressures of 15,000 psi. You get more use out of Buttress-Thread tubing because, unlike upset pipe, if ends are damaged, they can be repaired by cutting new threads right in the field. For more information on casing or tubing with the Buttress-Thread, call or write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Penna.





USS and National are registered trademarks

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National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

This mark tells you a product is made of modern, dependable Steel.

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What's NEW ... in equipment

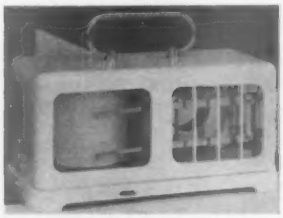
linear problems of complexity equivalent to the general case of three simultaneous second-order differential equations, with some reserve capacity. For more complex problems, two or more computers can be easily linked together.

The Short general-purpose computer promises to be particularly useful in searching for new chemicals and new processes for producing them. Source: **Short Brothers & Harland Ltd.,** Queens Island, Belfast, North Ireland.

Pipe plugger for low pressure

Pipe can be quickly and effectively plugged off at pressures to 60 psi. and temperatures to 180° F. with a new low-pressure plugging machine that has been brought out, complete with welding fittings.

With the new machine, you can isolate a section of pipeline for repairs, additions, or replacements, without having to interrupt flow. At present, two sizes are available: 2 and 3 in. Source: **T. D. Williamson, Inc.,** P. O. Box 40, Tulsa 2, Okla., U.S.A.

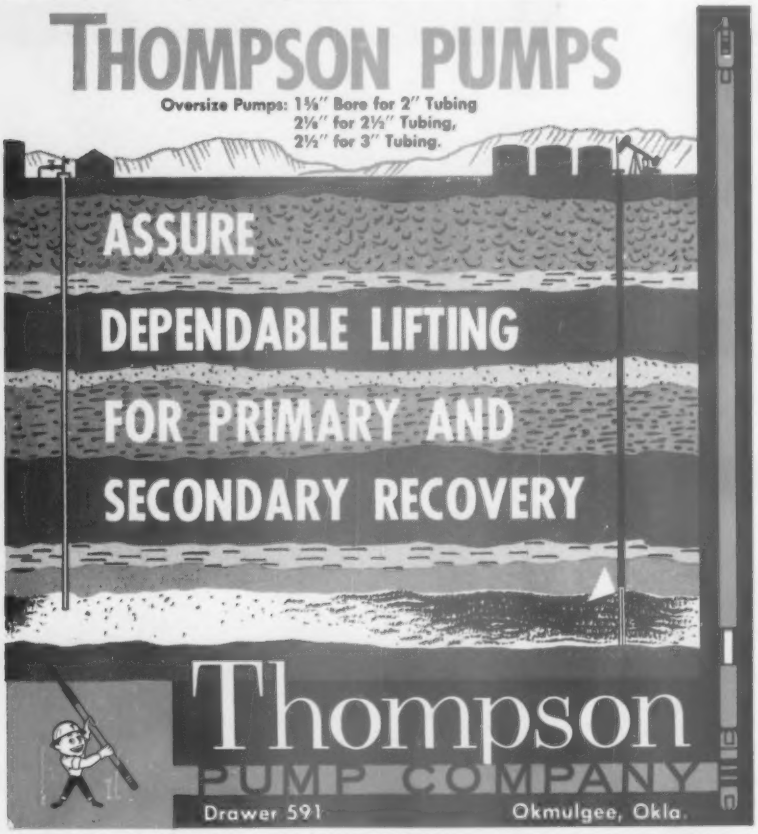


Compact recording thermohydrogaph

Both temperature and humidity records can be obtained readily with a new lightweight (3½ lb.), compact portable thermohydrograph, Model WE-24-12. The in-

THOMPSON PUMPS

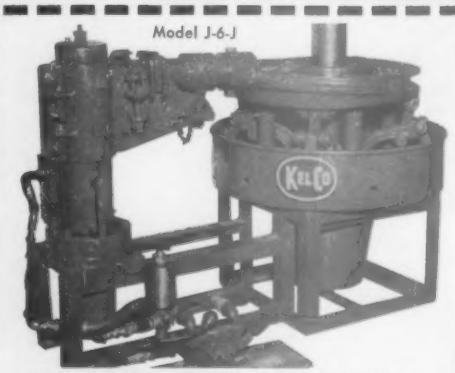
Oversize Pumps: 1⅝" Bore for 2" Tubing
2⅛" for 2½" Tubing,
2½" for 3" Tubing.



Thompson PUMP COMPANY

Drawer 591 Okmulgee, Okla.

Model J-6-J



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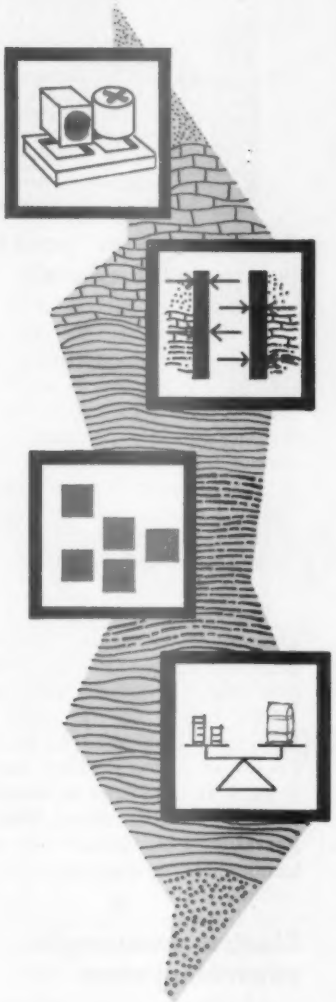

All barium sulfate mud weighting materials look and weigh about the same, but they perform differently. Each mud company sets its own standards of quality. BAROID sets the highest standards.

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The precision pipe threads make-up easy and are leakproof. The acme threads on sub and nut make-up fast. The ball and cone seat is a positive leakpoof seal. The three lug Fig. 100 (above) can be made up with a bar or hammer.

Standardize with WECO on all your production hook-ups and field connections to simplify installation and save money on subsequent changes or additions.

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strument is designed to withstand field work in rough country.

Clockworks can be obtained for recording on a 24-hour, 7-day, or 14-day basis. Humidity range is 0 to 100%. Normally, the temperature scale is −20° to 120° F. Graphs scaled to −30° to 130° F., −20° to 140° F., and 10° to 110° F. are available, as well as the Centigrade equivalents. Drum size is 3 by 3 in. Case size is 8½ by 4 by 4 in. Source: **Kahl Scientific Instrument Corp.,** El Cajon (San Diego), Calif., U.S.A.

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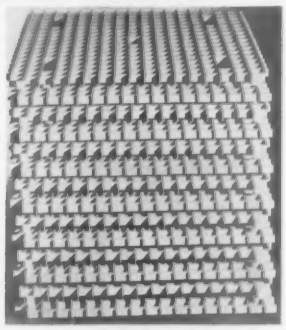


Cooling-tower packing is made of plastic

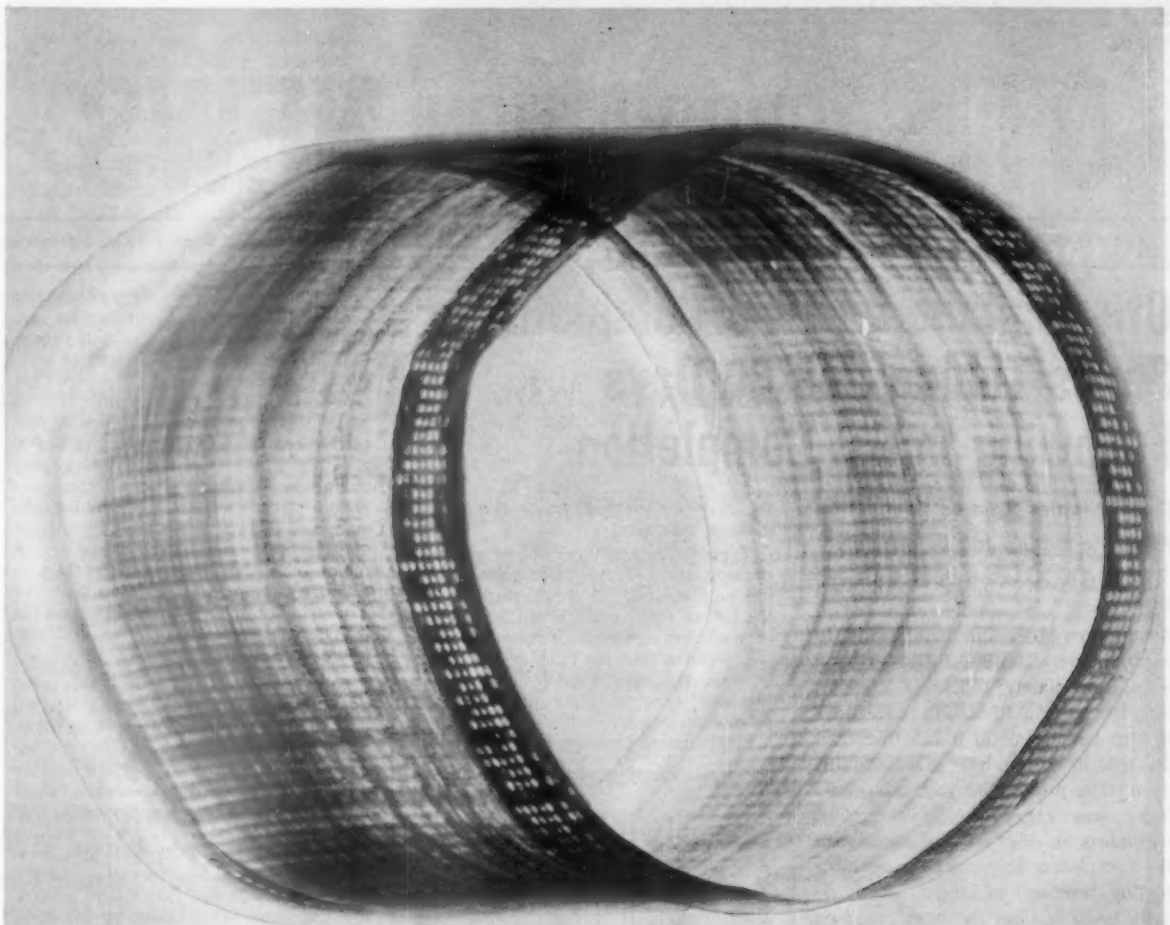
A plastic packing molded from either high-impact polystyrene or high-density polyethylene is available for cooling towers which indicates several advantages over timber packing. It can be used in much thinner sections as it is not subject to the deterioration common to timber packing. This permits a greater water-air contact surface without increased obstruction to air flow.

The Polygrid packing is constructed so each grid is 1¼ in. deep and spaced 1¼ in. from the next one. A splash strip on the T-bars breaks up the water as it falls from one layer to the next. Each unit of the packing measures 3 by 3 ft. and can be nested for transport. Source: **Head Wrightson Processes Ltd.,** 20-24 Old Street, London E.C.1, England.

●

Electro-pneumatic control system

Advantages of both electric and pneumatic control are combined in a new control system which has been evolved to solve complex control problems in process plants. The electrical control system offers the



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For fast delivery of Crane precision-built valves, see your Crane Distributor or write Crane Co., Industrial Products Group, 4100 S. Kedzie Avenue, Chicago 32, Ill.

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SPECIAL REPORT TO MANAGEMENT

OTIS PRODUCTION NEWS

Volume II, Number 5 **Otis Engineering Corporation • Dallas** *Production Equipment and Service*

Otis-Engineered Dual Completion Saves Tubing Job 30 Days Following Initial Completion

Otis S Nipples Used on Completion Postpone Tubing Job Indefinitely

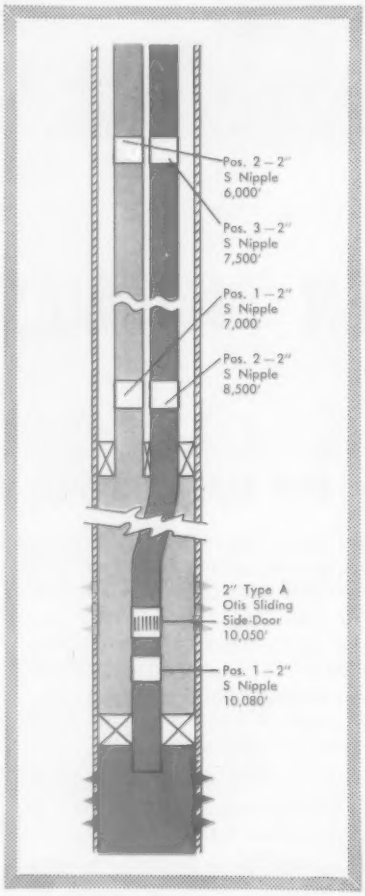
THOMPSON CREEK FIELD, MISS. — A well, dually-completed in this western Mississippi field, produced approximately 200 B.O.P.D. from each zone immediately following completion. In less than 30 days the two zones had to be placed on pump due to a decrease in bottom-hole pressure. This change in production methods could have been expensive, however Otis specialists in the area had designed the completion to permit the operator to flow this well as long as economically feasible, *then put both zones on pump without pulling tubing.*

The well was completed using two packers, a dual and a single, a Type S Otis Landing Nipple and a Type A Otis Sliding Side-Door® in the long string between the two packers for plugging and circulating purposes, and two Type S Landing Nipples above the dual packer in both strings. (See schematic diagram).

Economical conversion to artificial lift was accomplished by landing Otis Type S Pump Locators and Hold-Downs in the top S nipple of each string and installing the pumps. The completion is also designed to permit the locators and pump hold-downs to be reset by economical Otis wire line methods as the zones deplete. Resetting the pumps is accomplished by pulling the pumps, retrieving the locators and hold-downs, changing selective keys on the locators, and rerunning the tools to the lower nipples.

By using Type S Otis Landing Nipples instead of regular A.P.I. pump seating nipples, the tubing remains full-opening to permit running through-tubing perforating guns, bottom-hole pressure bombs, and other wire line service tools. Also, plug chokes and other Otis subsurface flow control equipment may be set in any of the S nipples should it become necessary.

Type S Otis Landing Nipples are full-opening, selective-type, non-ported landing nipples designed to be made up in the tubing string upon initial completion or workover of a well to provide a positive locating seat for landing subsurface flow control tools. Type S Otis Landing Nipples were first introduced to the petroleum industry in 1948 and represent a breakthrough to more efficient production of oil and gas wells through selective wire line methods. These nipples are designed to provide the following: (1) positive locating recesses for subsurface controls; (2) positive locking recesses for subsurface controls; (3) a honed surface for packing to permit subsurface controls to withstand up to 10,000 p.s.i. differentials, and (4) full-opening design with physical characteristics greater than that of N-80 tubing. As many as five Type S Otis Landing Nipples may be made up in a single string of tubing on standard installations. Type S Landing Nipples are available in 1¼-inch through 4-inch sizes and in many materials with standard and premium type threads.



Key to the wide use and successful application of Type S Nipples is that all Otis subsurface flow controls designed to be used with the S nipples incorporate an exclusive feature in that the locking device must be moved downward before the fishing neck can be engaged. This feature is designed to prevent the pulling of subsurface controls if there is a pressure differential across the tool . . . adding to well safety in that this acts to prevent the tool from being blown up the hole.

Your Otis specialist is trained to recommend the proper use and location of Type S Landing Nipples. His knowledge of the production versatility available with Otis Selective Landing Nipples can be a great asset for efficient and economical initial completions or workover operations. Otis Completion Specialists have wide experience in their field and are backed by complete engineering and development facilities in Otis' Dallas headquarters. For complete information on Otis Landing Nipples and Subsurface Production Equipment, call the Otis office nearest you or write Otis, Dept. 5-W, P.O. Box 35206, Dallas 35, Texas. You'll find experienced Otis Well Completion Specialists ready to help you . . . anxious to serve you . . . with the widest variety of field proven production equipment and services available today. ©1961 O.E.C.

OTIS

Engineering OTIS Corporation

General Offices:

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possibility of arranging any measuring and controlling circuit desired, and of transmitting the measured variables over relatively long distances. In comparison, the pneumatic control system permits fast-acting actuators to be used.

The combined electro-pneumatic system, called Teleperm-Telepneu, is designed so the transition from electric to pneumatic operation, or vice versa, can be arranged to take place either at the input of a controller, within the controller, or at its output side, as desired. Source: **Siemens & Halske A.G.,** Wernerwerk, Berlin, Germany.

•

Latest analyzer offers fast sulfur-compound measure

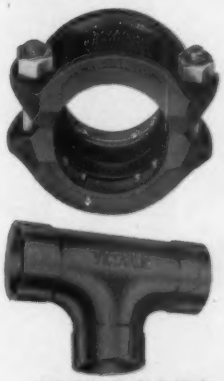
The major sulfur compounds in natural or LP-gas, petrochemicals, and other materials in the gaseous state can be measured quickly with a new lightweight and portable instrument, called the Model 3013 gas titrator. The instrument is packaged in a modular aluminum case and powered by an expendable wet battery.

An electrochemical cell is used for reagent generation, and a polarized electrode system is used for detection of the titration end point. The instrument generates by electrolysis metered amounts of bromine or iodine which react with sulfur compounds in the sampled gas.

The compounds may be titrated continuously in a flowing sample stream or absorbed in a suitable solution and titrated as a batch sample. Selective filters connected in the sample line ahead of the titration cell separate hydrogen sulfide and mercaptans from the other sulfur compounds. Source: **American Systems Inc.,** 1625 E. 126th, Hawthorne, Calif., U.S.A.

NEW PLAINLOCK COUPLINGS AND FITTINGS

For Low Cost Jointing of Plain End Pipe



- Speed Installation — Save Time and Labor — Cut Piping Costs
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- Join standard or light wall carbon or stainless steel, aluminum and other piping materials

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To drive this pump,

ten 3V Gates Super HC V-Belts transmit power that would require 21 conventional B-section V-belts.

3/8" 3V

11/16" B

How to save weight...space...cost with Gates Super HC Drive

Two types of V-belt drives were designed for this pump, used by Phillips Petroleum Co. in waterflooding operations at the South Burbank Field in Oklahoma. One was a Gates Super HC High Capacity V-Belt Drive. The other was a conventional V-belt drive.

This installation requires only ten 3V Gates Super HC V-belts to transmit power that would require 21 conventional B-section V-belts.

By installing the Gates Super HC Drive, Phillips reduced drive cost . . . saved 197 lbs. in drive weight . . . 74% in drive space . . . plus saving the cost of an outboard bearing that would have been necessary had the conventional V-belt drive been used.

All of these savings are the result of basic design changes that Gates has made in V-belt shape, construction and materials. Because of these changes, Gates Super HC V-Belts can handle up to 3 times the horsepower of conventional V-belts in the same space.

Many additional savings are possible: reduced bearing loads, longer bearing life . . . more compact guards and machine housings with lower material costs and weight . . . belt speeds up to 6,000 ft/min without dynamic balancing, often permitting use of lower cost, higher speed motors.

For expert drive design help, *and for complete technical service, contact your local Gates Man by calling your nearby Gates-stocked supply house.*

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Gates

Building the future on 50 years of progress

Gates Super HC V-Belt Drives

What's NEW

. . . in literature

Instruments and controls

NEW FOUR-PAGE Bulletin G14-1 illustrates and describes fluid meters for recording, indicating, and integrating; transmitters and recorders for pressure and draft; level transmitters; and temperature instruments. The literature piece contains information on plug-in components, the Flamon detector, analysis instruments, and 700 analog and digital systems. Source: **Bailey Meter Co.,** 1050 Ivanhoe Rd., Cleveland 10, Ohio, U.S.A.

Steam generators

FOLD-OUT PAGES reveal at a glance design and construction details of the Keystone 2-drum water tube package boiler for oil or gas firing. The 16-page catalog is complete with full color cutaway views. Source: **Erie City Iron Works,** Erie, Pa., U.S.A.

Sensing, switching system

CATALOG 4-1 (four pages) introduces the Sonac, a noncontact system for sensing and switching using ultrasonic energy for its "beam." The basic system consists of two sensors and a control unit. Applications include automatic counting, plant protection, size control, and machinery safeguard. The literature offers photographs of the instrument, along with operation data and optional equipment. Source: **Delavan Mfg. Co.,** Grand Ave. and Fourth St., West Des Moines, Iowa, U.S.A.

Recording instruments

COMPREHENSIVE Catalog 625 covers recording and controlling instruments for temperature, pressure, humidity, and time-of-operation. The publication offers aids for rapid, accurate selection of the proper instrument to meet specific requirements. It includes a guide for determining thermal systems, diagrams of typical bulb installations, illustrations of basic instruments and fittings, along with complete

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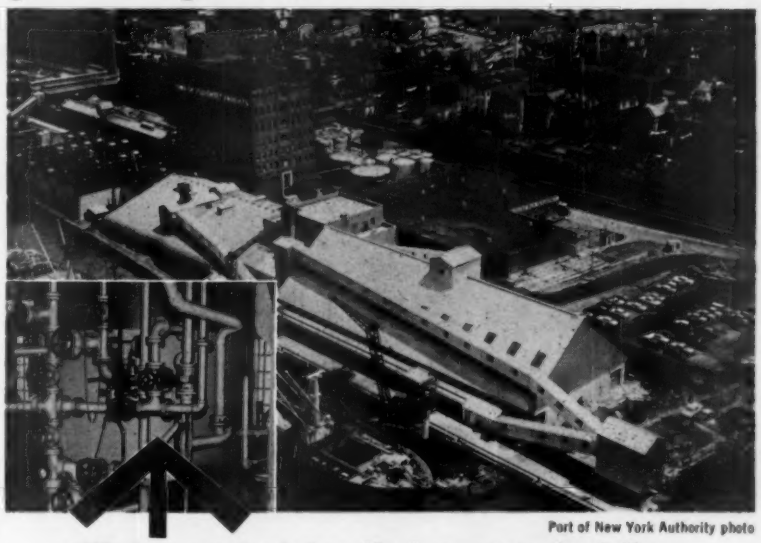
good designs made better with aluminum



Port of New York Authority photo

. . . with low-cost piping that ensures fast flow, no metallic contamination handling liquid sugar for Refined Syrups & Sugars, Inc.

The piping system you see here makes good use of the natural corrosion resistance of aluminum to handle liquid sugar at Refined Syrups & Sugars, Inc., Yonkers, N.Y. The major benefits: no product contamination, long service life and low maintenance. Actually, the use of aluminum pipe insures palatable sugar solutions, especially in final refining stages. Aluminum's corrosion resistance contributes to the uniform high quality of the sugar, guaranteeing freedom from metal pick-up. Low friction factor speeds syrup flow . . . and initial cost is surprisingly low. You see once more how ALCOA® Aluminum adds major improvements to a basic good design. See how it can do the same for your designs. Simply mail the coupon.

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Aluminum Company of America, 826-H Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries:

- ☐ 34-10197 Aluminum Pipe and Fittings
- ☐ 34-10418 Alcoa Unitrace: Combines Piping and Tracing in One Unit
- ☐ DD-514 Alcoa Duotrace Technical Report
- ☐ 68-10460 Process Industries Applications of Alcoa Aluminum
- ☐ 50-19415 Welding Alcoa Aluminum

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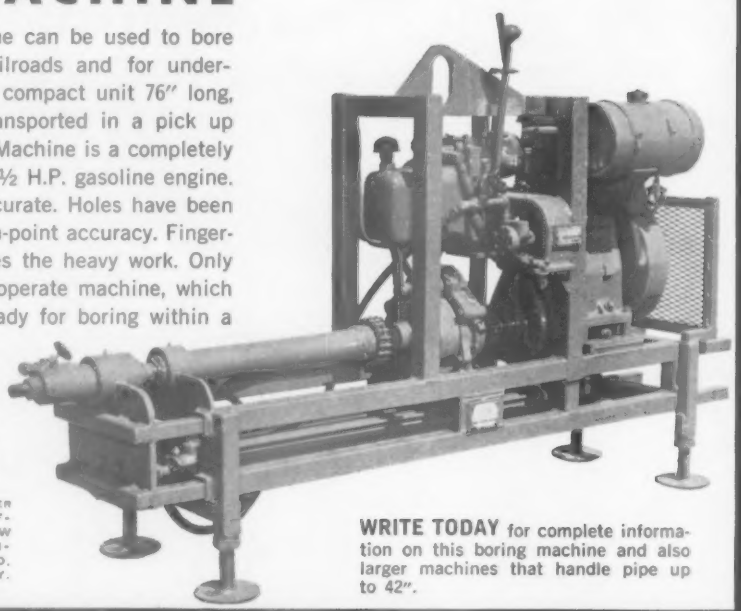
BORING MACHINE

The Crose portable boring machine can be used to bore holes under streets, highways, railroads and for underground service. The machine is a compact unit 76″ long, 39″ high and 20″ wide. Easily transported in a pick up truck since it weighs only 595 lbs. Machine is a completely self-contained unit powered by a 7½ H.P. gasoline engine. Outside power is not required. Accurate. Holes have been bored up to 75 feet with almost pin-point accuracy. Fingertip controlled hydraulic power does the heavy work. Only 12 feet of open ditch required to operate machine, which can be positioned in bell hole ready for boring within a few minutes.



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- No metal to metal contact — wiping action assures longer life

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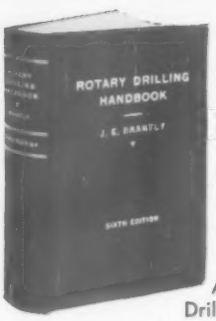

ROTARY DRILLING HANDBOOK

SIXTH EDITION

by J. E. Brantly, former president of Drilling and Exploration Co. and former president of the American Association of Oil Well Drilling Contractors. *1961, 840 pages, bound in fabricoid, $12.50.*

With the aid of more than 25 experts in various phases of the drilling industry Mr. Brantly has completely rewritten and greatly enlarged the Rotary Drilling Handbook which has been the standard reference work in this field for a quarter of a century. An appendix of 206 pages includes charts, formulas and tables to aid the driller and the engineer in solving perplexing problems.

CONTENTS

Basic Principles
Derricks, Masts and Sub-structures
Power Plants and Prime Movers
Circulating Pumps
Hoists
Rotary Machines
Drilling Feed Controls
Derrick Hanging Tools
Lubrication
Wire Lines
Drilling Shaft
Pipe and Depth Measurements
Bits
Drilling Fluid
Air and Gas Drilling
Weight on Bit and Rotating Speed
Balanced Rotary Drilling Practices
Instruments
Straight Hole Drilling
Directional Drilling
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Casing and Casing Accessories
Cementing
Casinghead Control Equipment
Hydraulics of Drilling Fluid
Safety Measures
Geology
Reports and Accounting
Glossary

Order from: The Oil and Gas Journal, Tulsa 1, Okla.

specifications and prices. Source: **Weksler Instruments Corp.**, Freeport, L. I., N. Y., U.S.A.

Buildings for field housing

ACCORDING TO A newly published six-page folder, "Economy S" series buildings are skid-mounted, knocked down and ready to ship for ease of handling and freight saving. Or they may be shipped erect. The folder presents photos and interior drawings of the units, features, materials, and construction specifications. Source: **Porta-Kamp Mfg. Co., Inc.**, Box 7064, Houston 8, Tex., U.S.A.

Fire-protection methods used on tank-truck loading racks

What should be of special value to safety engineers, the contents of this new booklet include: (1) control of fire by water spray through fixed pipe systems and portable nozzles; (2) application of foam through pipe systems and portable nozzles; and (3) methods of proportioning foam liquid. Six illustrations are included. Source: **National Foam Systems, Inc.**, West Chester, Pa., U.S.A.

Corrosion: what causes it? what to do about it?

This handy, 5 by 8-in. booklet is packed with 40 pages of excellent information on corrosion. Individual chapters deal with causes and mechanics of corrosion and how to fight it. Other sections are concerned with the cement-lining process, installing the system, internal on-the-job cleaning, and hydrostatic testing. Special notes and a summary are included. Source: **Mid-West Cement Pipe Lining Co., Inc.**, Box 295, Crossville, Ill., U.S.A.

Coils, Fintubes, and special equipment

Highlight of this six-page publication is a set of Fintube engineering standards covering materials, size, surface area, number of fins, and efficiency factors available with various Fintubes. These include integral continuous resistance

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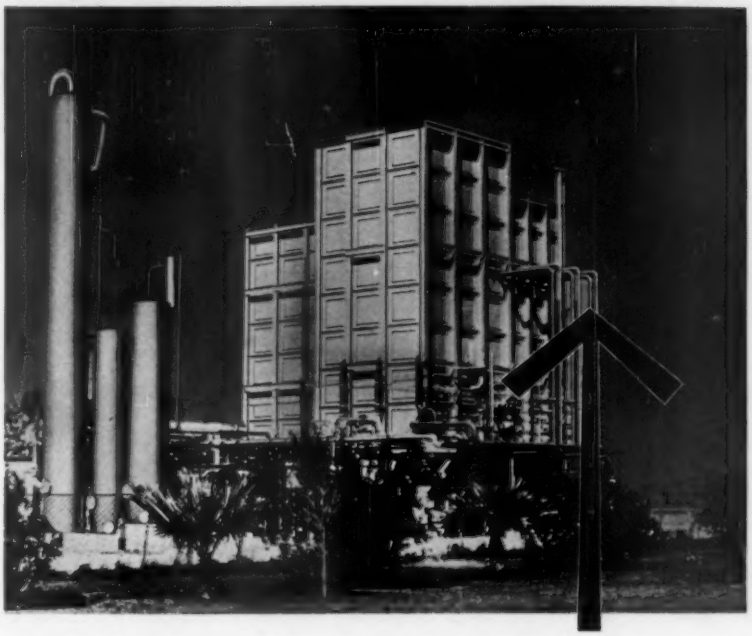
good designs made better with aluminum



Alcoa Aluminum stands up at cryogenic temperatures in oxygen plant designed and manufactured by Air Products, Inc.

At this oxygen plant built by Air Products, Inc., Allentown, Pa., for production of organic chemicals, aluminum was the logical material for construction of cryogenic equipment. ALCOA® Aluminum alloys have the ability to maintain ductility and resistance to shock loading at extremely low temperatures. In fact, tensile and yield strengths actually improve in the cryogenic ranges without embrittlement. Add low cost and ease of fabrication—small wonder that aluminum is preferred for low-temperature process vessels and transportation equipment. The coupon will bring you more information.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Aluminum Company of America, 826-HH Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries.

☐ 68-10460 Process Industries Applications of Alcoa Aluminum
☐ 88-11251 Cryogenic Applications of Alcoa Aluminum

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

THE
NEW
AMERICAN

SHORT DRIVE TO ANOTHER WORLD!

With today's fine cars and modern highways, another world may be just hours from home.

Another world, where it's so quiet a person can hear himself think. Where the only thing that's hurrying around is the breeze.

The new American knows the shortest way to get there. When he feels the need to get away, his car is ready to take him.

At the American Oil Company, we know of the many big and little ways the car is important to the new American. And we supply the kind of petroleum products and service that help it run the way he wants it to.

But we're never quite satisfied with things the way they are. For example, our scientists and engineers (we have more than a thousand) are testing fuels and lubricants by "driving" cars under the most severe conditions—without ever taking them outdoors! It's all done in the industry's newest and most advanced chassis dynamometer room.

You expect more from American—and you get it!

AMERICAN OIL COMPANY

AMERICAN

welded, high-temperature brazed, and extruded Fintubes, as well as combination Fintubes where various fin metals are combined with different tube materials. Bulletin 900 illustrates various types of Fintubes and coils in cut and twisted, perforated, and aluminum styles. Also summarized is a variety of gas cooling and heating equipment. Source: **Brown Fintube Co.,** 300 Huron St., Elyria, Ohio, U.S.A.

Mineral oxide insulated thermocouple materials

A new, 10-page catalog, describing the processes used to produce Tempac thermocouple material, is now available free for the asking. In addition to specifications and descriptive data on the metal-sheathed, ceramic-insulated wire, Catalog 2550 details facilities and the comprehensive in-process quality-control system of the manufacturer. Source: **Temptron, Inc.,** 7030 Darby Ave., Reseda, Calif., U.S.A.

The Story of Estor G

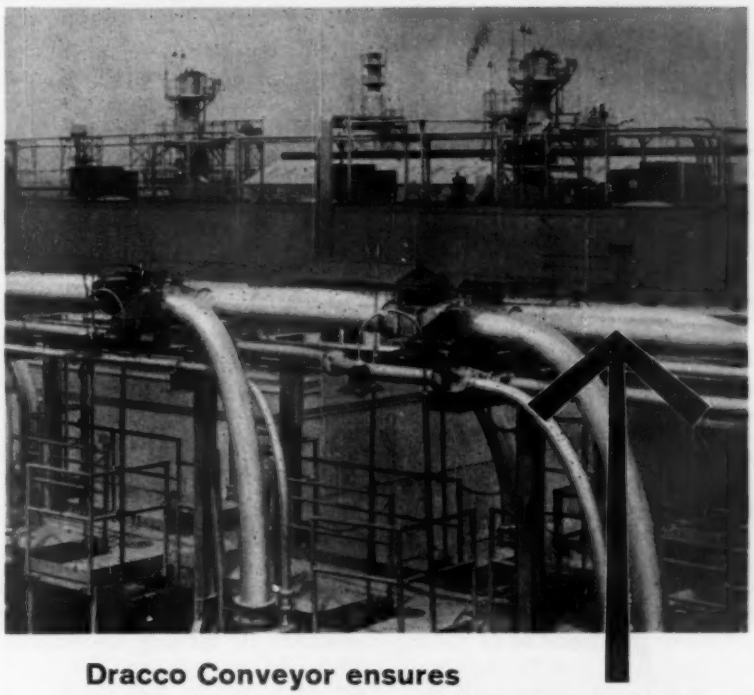
OBTAINABLE NOW, a 16-page brochure details this new lubricant for gas engines. The product is an intermediate-VI, naphthenic-base lubricant with a balance of detergents and inhibitors said to give outstanding lubrication and performance in both 2 and 4-cycle gas engines. The publication includes a list of typical physical inspections, along with comparisons of the lubricant with conventional inhibited mineral oils. Source: **Humble Oil & Refining Co.,** 1216 Main St., Houston, Tex., U.S.A.

Aftercoolers for compressed air and gas applications

Bulletin 120 covers the operating features and design characteristics which Paracoil Type AC aftercoolers provide for industrial air service. The eight-page literature discusses a floating tube sheet end which incorporates weep holes in the retaining ring to forestall mixing of shell and tube side fluids. Included is a table of sizes and capacities and associated moisture separators. Source: **Davis Engineering Div., Tube Reducing Corp.,** Box 959, Passaic, N. J., U.S.A.

from ALCOA

good designs made better with aluminum



Dracco Conveyor ensures contamination-free handling of polyolefins

Polyolefins, having stringent specifications for purity, require a special type of bulk handling. That's why this network of Dracco's Airstream Conveyor Systems incorporates miles of ALCOA® Aluminum piping. It's a multiphase system designed by Fuller Company's Dracco Division for Phillips Chemical Co., leading producer of high-density polyolefins. Aluminum piping protects product purity, avoids unwanted color. With aluminum, there's no maintenance inside or out; superior heat-transfer ability cools conveying gases. Perhaps aluminum can improve your good design. For more information, please send the coupon.

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☐ 34-10197 Aluminum Pipe and Fittings
☐ 34-10418 Alcoa Unitrace: Combines Piping and Tracing in One Unit
☐ 68-10460 Process Industries Applications of Alcoa Aluminum

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

▶▶▶ Equipment Men Notes

Manning, Maxwell & Moore appoints F. T. Sherwood

. . . as general sales manager of its Valve Division. Sherwood, who joined the company in 1939, was previously general manager of Manning, Maxwell & Moore of Canada, Ltd., Galt, Ont. He was also a vice president of the Canadian subsidiary. The Stratford, Conn. company makes various types of industrial valves, pressure gages, industrial instruments, cranes, and hoists.

Crane Co. forms French firm

. . . with headquarters in Paris. The new company—Cie. Crane—was established by the merging of two French valve manufacturers, J. Cocard, of Lille, and C.I.C.R.A. (Cie. Industrielle & Commerciale De Robinetterie, Raccords & Accessories), of Paris. Crane acquired control of both companies during the past year.

Cocard produces steel valves, and C.I.C.R.A. manufactures brass and iron valves, along with pipe fittings. The plants in Lille and Paris employ more than 1,000 people. Crane owns more than 75% of the outstanding stock in Cie. Crane, the remainder being held publicly in Europe.

Worthington Corp. appoints

. . . Hart Industrial Supply Co., of Oklahoma City, as distributor of air-cooled and water-cooled compressors. Hart Industrial's territory includes the state of Oklahoma except for Ottawa, Craig, and Delaware counties.

Morris D. Gilmore becomes

. . . district manager for Republic Supply Co.'s Rocky Mountain region with headquarters in Denver, it was announced by Frank E. Gault, vice president of sales. New district manager for North Texas is Ray Prater with headquarters in Wichita Falls.

Two new store managers have also been announced—Roger Rouse at Arkansas City, Kans., and D. T. Crain at Lake Charles. C. A. Ellender, former store manager at Lake Charles, has been named purchasing agent for Republic at Oklahoma City.

W. P. White, Jr. is exec. veep

. . . of Appleton Electric Co., announces Arthur I. Appleton, president of the Chicago-based electrical supplier. White was formerly with Continental Can Co. and White Cap Co.

Bucyrus-Erie Co. promotes

S. A. Stone

. . . Selden A. Stone to drill sales manager, taking the place of George D. Grayer, who has been appointed sales manager of the company's newly formed midwestern region. As drill sales manager, Stone is responsible for marketing blast-hole drills, water-well drills, and oil spudders. He formerly was assistant drill sales manager and previously served 5 years as sales manager of oil and water-well drills.

Montello, Inc. consolidates

. . . all processing, warehousing, shipping, and traffic departments into one central industrial area. Manufacturer of Pheno-Seal thermoset laminated plastic lost-circulation material, Montello is located in Sand Springs, Okla., and occupies a 15,000-sq. ft. plant.

Manufacturing facilities, previously located in Independence, Kans., will double the previous production capacity. The Montello plant is situated on a 3-acre tract, with 900-sq. ft. set aside for offices. Warehouse facilities will occupy 5,000-sq. ft., of which 3,500 sq. ft. have been allocated to processing the lost-circulation product.

Liberty Mfg. Co. of Texas adds

. . . W. J. Armour to its sales staff as a representative in the Houston area. Other changes in the Liberty sales force include the transfer of John D. Ruff from Houston to San Antonio; J. C. Hawkins from Wichita Falls to Fort Worth to represent Liberty in North Texas; Guy O. Denton from Fort Worth to Dallas to cover East Texas; and the expansion of R. H. Martin's territory, whose headquarters is in Shreveport, to include Arkansas, Louisiana, Mississippi, and Alabama.

25TH ANNIVERSARY of the founding of Harley Sales Co., Tulsa, also marked Harley's 25th year as engine distributor for Wisconsin Motor Corp. Shown renewing the Tulsa firm's contract as Wisconsin's exclusive engine distributor are, from left: H. A. Todd, Wisconsin president; Bob R. Neal, Harley president; Phil Norton, Wisconsin vice president; and Ray J. Fellows, Wisconsin vice president and sales manager. Harley's offices, warehouses, and shops are located in Tulsa, Wichita, and Houston. The company also builds portable units to handle various types of pumping requirements for pipeline and oil-producing companies.

J&L Supply Division appoints

. . . two district store managers and transfers another, according to A. G. Bastian, manager of field operations. J. W. Crownover, Jr., store manager at Worland, Wyo., has been promoted to district store manager at Odessa; J. J. Crawford, in charge of J&L's store at Liberal, Kans., has been appointed district store manager at Borger, Tex.; and Evan Smith, store manager at Borger, Tex., has been transferred to Liberal in the same capacity.

H. Z. Carter elected president of Avondale Shipyards, Inc.

H. Z. Carter

. . . succeeding J. H. Bull who retired. Carter was formerly, executive vice president of the New Orleans corporation. He joined Avondale in 1947. He moved from comptroller to general manager and, in 1954, was made executive vice president and a member of the board of directors.

It was also disclosed that Sam P. Stone has been elevated from vice president to executive vice president and that Edwin H. Fletcher, former chief engineer, will move into the post of vice president of engineering.

J. Robert Holmes is appointed

J. R. Holmes

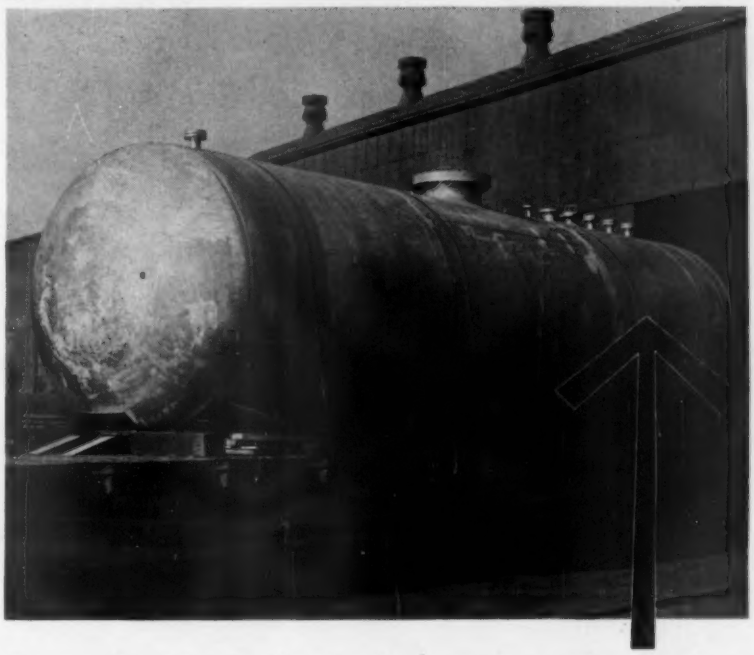
. . . service sales manager for Johnston Testers, Inc., it was announced by B. R. Dixon, vice president. Holmes will supervise a sales force covering a 22-state area. After joining Johnston in 1959 as city salesman in Houston, Holmes became staff sales specialist. Prior to 1959, he was with Union Tank Co. serving as a sales representative.

Oil Well Supply Division names

. . . Roy A. Johnston, Jr. as field representative at El Dorado, Ark. He was employed by the division in 1952 at Shreveport. Johnston

from ALCOA

good designs made better with aluminum



Graver tank for rocket fuel prevents contamination, reduces general maintenance

Built by Graver Tank & Mfg. Co., East Chicago, Ind., division of Union Tank Car Co., this aluminum pressure vessel stores rocket engine fuels for a famous eastern aerospace contractor. It was constructed for a design pressure of 45 psi, and was welded automatically. Aluminum prevents product contamination, resists corrosion, costs less to maintain. Whether product storage is an intermediate or final step in your operations, tanks of ALCOA® Aluminum will help cut costs and preserve product purity. Send the coupon for more information.

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Aluminum Company of America, 826-VV Alcoa Building, Pittsburgh 19, Pa.
Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries.

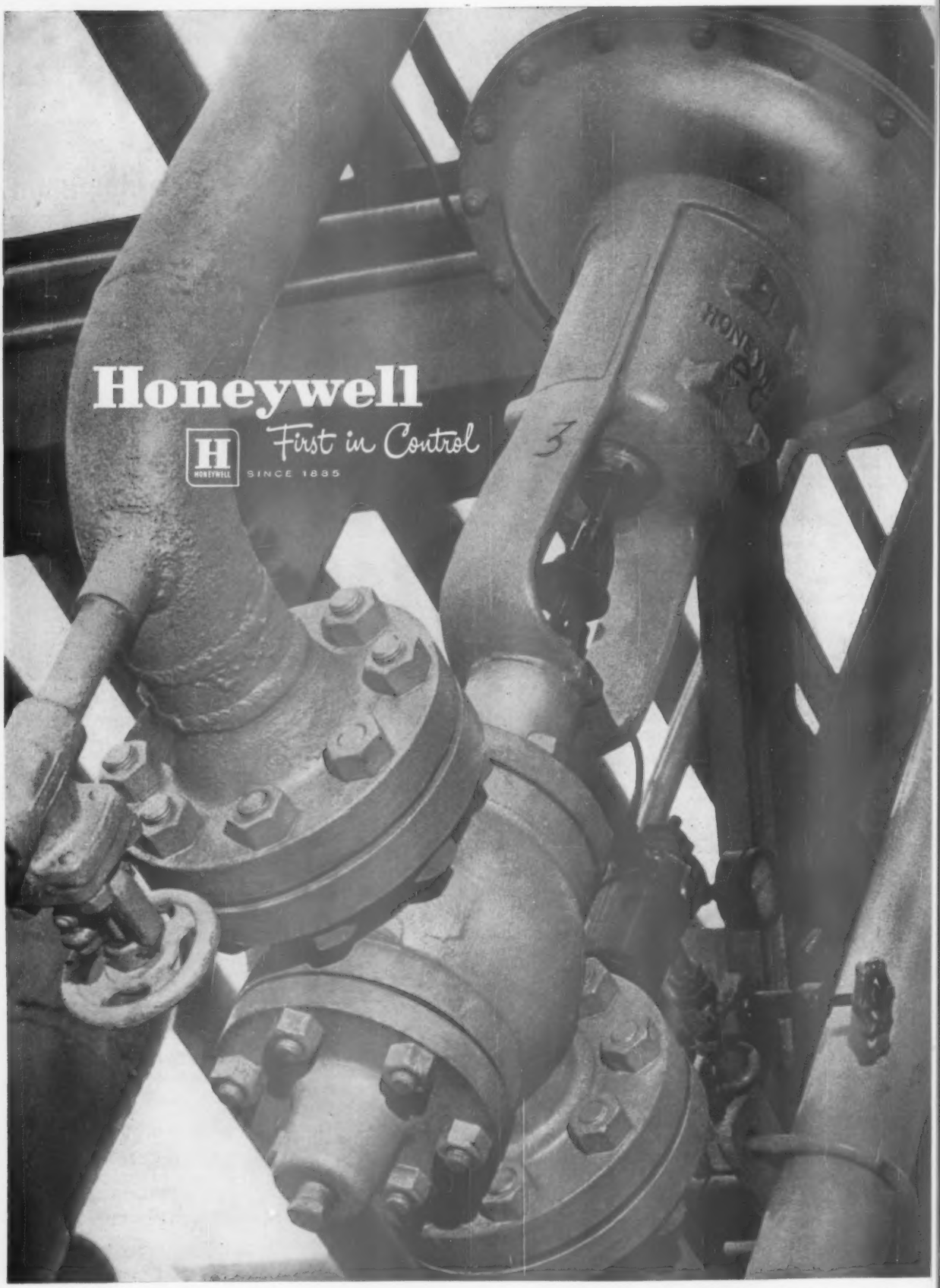
- ☐ 34-10197 Aluminum Pipe and Fittings
- ☐ 34-10418 Alcoa Unitrace: Combines Piping and Tracing in One Unit
- ☐ DD-514 Alcoa Duotrace Technical Report
- ☐ 68-10460 Process Industries Applications of Alcoa Aluminum

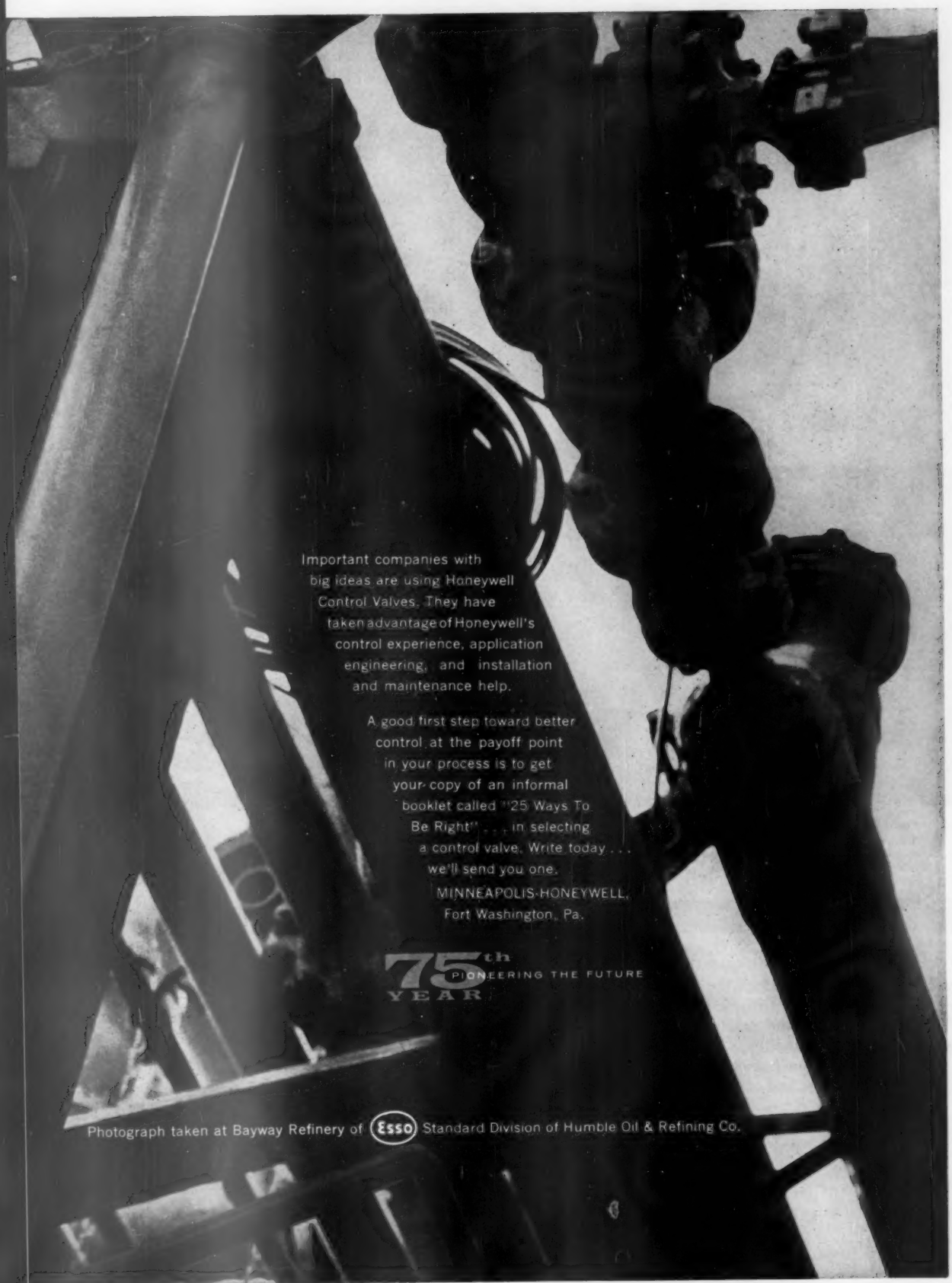
Name _____ Title _____

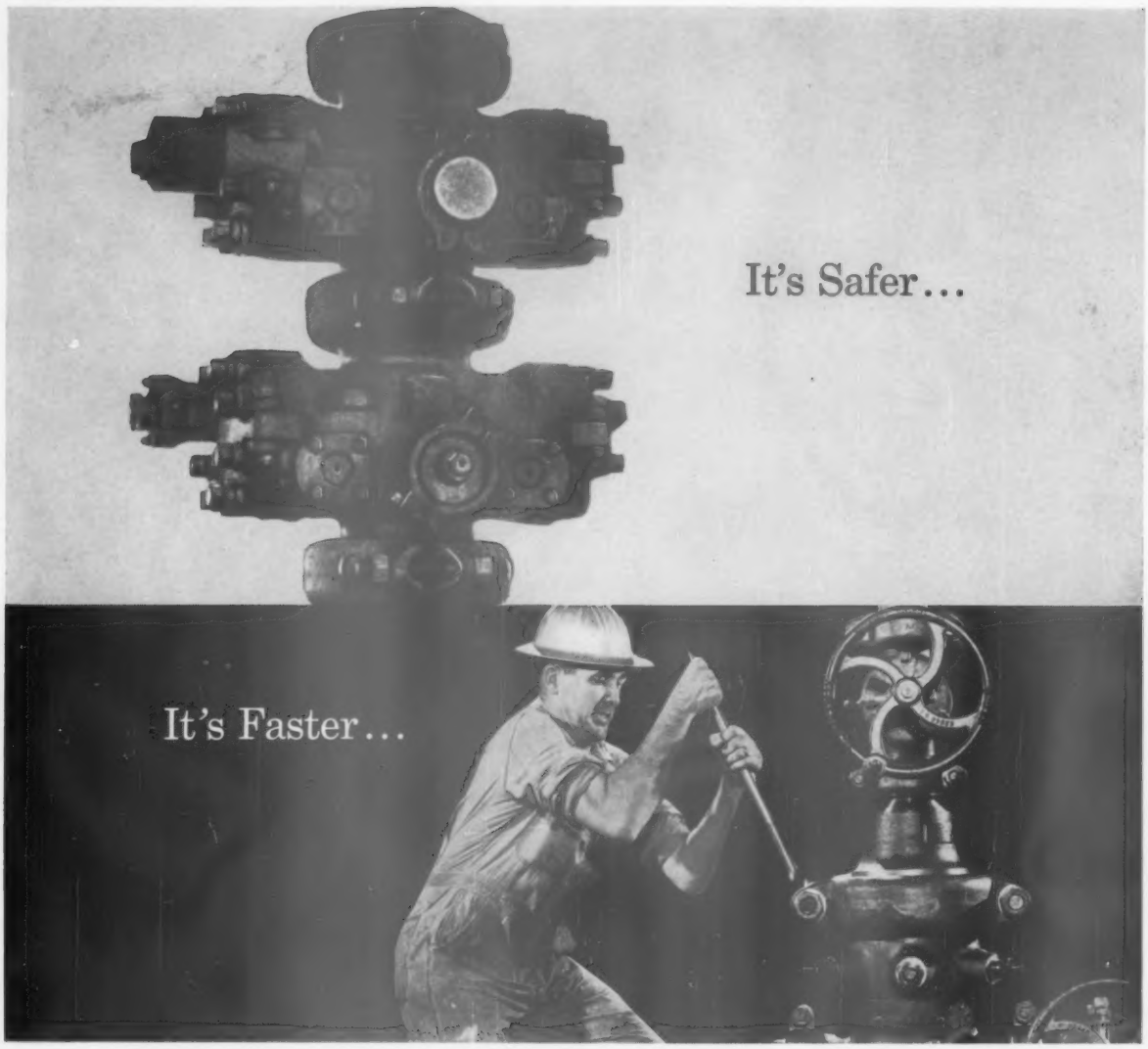
Company _____

Address _____

City _____ Zone _____ State _____


Honeywell
First in Control
SINCE 1885


Important companies with big ideas are using Honeywell Control Valves. They have taken advantage of Honeywell's control experience, application engineering, and installation and maintenance help.
A good first step toward better control at the payoff point in your process is to get your copy of an informal booklet called "25 Ways To Be Right" . . . in selecting a control valve. Write today . . . we'll send you one.
MINNEAPOLIS-HONEYWELL
Fort Washington, Pa.
75th YEAR
PIONEERING THE FUTURE
Photograph taken at Bayway Refinery of Esso Standard Division of Humble Oil & Refining Co.



It's Better BECAUSE OF GRAYLOC

Gray systems of well control with *Grayloc*® connections have been used on the highest pressure wells so far discovered; and *Grayloc* has enabled Gray Tool Company to design and manufacture the first 40,000 psi test well head assembly.

Grayloc connected assemblies are faster and easier to install, weigh less and are smaller than equally rated flanged assemblies. They resist vibration and remain tight without further attention.

Let a Gray representative show you how *Grayloc* connected well head systems can save space, weight, time and money for you. Write today for additional information and the Gray catalog.

GRAY *Tool Company*

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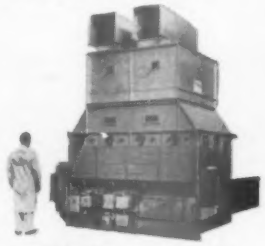
BUILDS THE BEST HEAT TRANSFER PRODUCTS . . .
FOR THE CHEMICAL AND PETROLEUM INDUSTRIES

HC® AIR COOLED COOLERS AND CONDENSERS

In 14 basic sizes, either as single or multiple units, for handling large capacity cooling requirements for gases, oil and water, process fluids, and condensing steam and vapors. Catalog No. 557.

HEAT EXCHANGERS

Young offers a complete line of shell and tube fixed and removable type Heat Exchangers, for cooling jacket water, lube oil, gases and process fluids. All stainless steel construction available in fixed bundle arrangement. Many sizes from stock. Fixed tube bundle Catalog No. 1261. Removable tube bundle Catalog No. 1160.



EVAPORATIVE COOLERS AND CONDENSERS

Available in 8 models, with single, two or four coil assemblies. Engineered for cooling jacket water, lubricating oil, hydrocarbon gases, condensing steam or other vapors. Catalog No. 1959.

Write to Dept. H-391 for Catalog required

YOUNG RADIATOR COMPANY
RACINE, WISCONSIN
Plants at Racine, Wis. and Mattoon, Ill.

was transferred to El Dorado in 1955, to Shreveport in 1956, and back to El Dorado in 1959. Other division appointments include C. H. Stewart, now manager of the Garland, Tex. works, and J. F. Brown, named manager of production at Garland.

Thomas M. Bennett is promoted

T. M. Bennett

. . . to administrative manager of Lummus Co.'s Engineering Development Center in Newark, N. J., according to M. E. Brooks, vice president and director of engineering. Bennett joined Lummus as a research engineer in 1946. Prior to his newest promotion, he was manager of the pilot-plant-construction department of the Engineering Development Center.

John H. Kilmer, Jr. elected

J. H. Kilmer, Jr.

. . . president and general manager of Golden-Anderson Valve Specialty Co. at a recent meeting of stockholders. Grant A. Colton is now vice president and chairman of the board; Paul B. Brauer is vice president and treasurer; and H. Carl Brandt is secretary. These four plus Robert E. Colton and Edwin Elliott comprise the new board of directors.

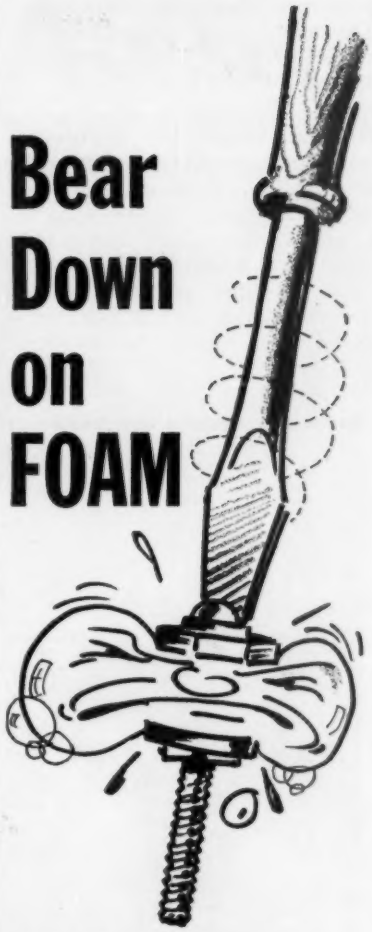
License to make Yoloy steel

. . . has been issued by Youngstown Sheet & Tube Co. to the Tubular Products Division of Babcock & Wilcox Co. The license, the first issued by Youngstown, enables Babcock & Wilcox to manufacture and sell welding fittings and other products of Yoloy steel.

PESA gets new member

. . . with the addition of Aztec Mfg. Co., with headquarters in Fort Worth. More than 150 firms engaged in various phases of the petroleum-equipment manufacturing, supply, and service industries make up the membership of Petroleum

Bear Down on FOAM



with Dow Corning Silicone Defoamers*

There's a *right* tool for every job. In foam control it's Dow Corning silicone antifoamers or defoamers . . . job-proved thousands of times over as the most efficient, most economical, and most versatile foam suppressors available.

*At prescribed levels, are sanctioned by FDA

FREE SAMPLE
and new manual on foam control

first in silicones
Dow Corning CORPORATION
MIDLAND, MICHIGAN

Dept. 8820

Please rush a FREE SAMPLE of a Dow Corning silicone defoamer for my product or process, which is (indicate if food, aqueous, oil or other): _____

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

_____

Equipment Suppliers Association. The nation-wide organization is headed by W. H. Larkin, president of Larkin Packer Co.

National Supply Div. transfers ... Herman H. Vaughn, Jr., wellhead sales representative, from Odessa to Lafayette. He succeeds Loyd H. Waites, who was transferred to Hobbs. R. B. Hill, wellhead sales supervisor for the southern region, has been shifted from Dallas to the regional headquarters at Houston.

Kenneth D. Fisher elected prexy ... of Cherokee Laboratories, Inc., and moves up from his former post as vice president in charge of sales. The presidency of Cherokee Laboratories has been vacant since the death of David Garrick in July 1959 in an airplane crash. William Wood, the vice president, died in the same accident.

Since that time Cherokee has been managed by Robert Denny, vice president, and a group of executives, including Fisher. Denny continues as vice president and treasurer of Cherokee plus its three subsidiaries. Cherco Equipment, Inc., and Garzo, Inc., of Longview, Tex., and Polymeros, Inc., of Tulsa.

Vernon E. Pray assumes title ... as domestic sales manager of Schield Bantam Co., Waverly, Iowa, manufacturers of power cranes and excavators. In addition to working directly with the company's domestic distributors, Pray will direct the sales-development department which includes all advertising, sales promotion, and sales training, along with a separate market-research section. Pray, who joined the company in 1949, was Schield Bantam's first advertising manager. He later became sales-development manager, the position he held up to the present time.

Harry Ramsey joins sales force ... of W. C. Norris Division, Dover Corp., and is assigned to the company's Tri-State Division. He is headquartered in Mt. Pleasant, Mich. to service accounts in Michigan, Ohio, and Ontario, Canada. Ramsey was formerly with Midway Supply Co. as a field representative. More recently he served as division manager for Turret Supply Co., Ltd., of Ontario.

E. W. Upton becomes manager ... of the Rubbercap Division of Plastic Applicators, Inc., Houston, in which capacity he will direct all division sales and manufacturing operations. Upton has had 26-years experience in engineering and sales executive positions. He has been president of New York Rubber Co., executive vice president of Refinery Engineering Co., vice president and general manager of F. H. Maloney, and regional manager of Byron Jackson. Rubbercap Division manufactures molded rubber products and applies rubber linings to tanks.

WISCONSIN-POWERED TAPESTER
is made by the A. E. Betzel Engineering Co., Arlington, Tex. It is available for line travel and stationary wrapping for pipes with 4" to 12" diameters.

WISCONSIN-POWERED pipe wrapper cleans and tapes automatically

Set it, and start it. That's all it takes to clean and tape pipe in the field with the Wisconsin-powered Tapester. It's automatic and fast — and saves time and cuts costs with every revolution.

The 18-hp two-cylinder air-cooled Wisconsin cuts machine size and weight — makes it easy to move from job to job. You can set the unit up or remove it from the job in minutes — and without cutting the line.

The rugged air-cooled Model THD Wisconsin compounds your savings. This precision-built high-torque engine will give you years of trouble-free service at the lowest upkeep cost. That's why you'll find dependable Wisconsin Engines in countless sun-baked, cold-bitten, remote oilfield installations.

Mechanize your oilfield utility units with all-weather Wisconsin Engines—3 to 56 hp. Write for Bulletin S-251.

WISCONSIN MOTOR CORPORATION
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

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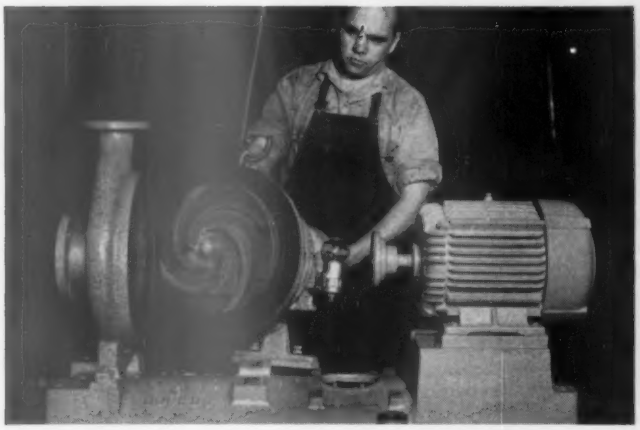
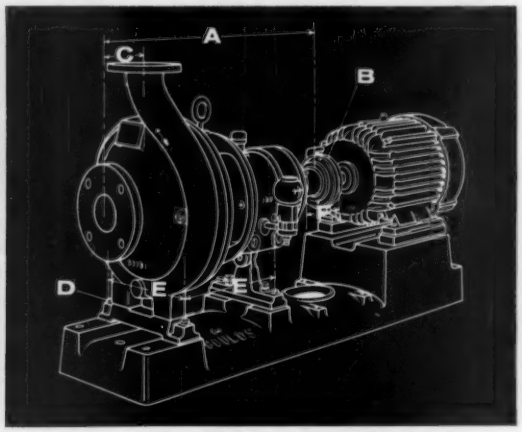
Oil Field Distributors for Wisconsin Engines and all types of Utility Units

J-228

PUMPAGE

Goulds news about pumps for process industries





Standardized design features

Model 3195 gives you the greatest range of coverage and flexibility—with minimum parts needed—of any design on the market.

To meet varying service conditions, you can mount any one of the 11 pump ends to any one of three bearing frames (shafts 1¼, 1¾, and 2⅛ through stuffing box). Nominal impeller diameters of 6″, 8″, and 11″ cover the range. Capacities to 775 G.P.H., heads to 300 ft. TDH. Handles liquids up to 500°F.

Dimensional interchangeability between all Model 3195 pumps

With this top-centerline, broad-coverage design, you can interchange pumps without making expensive piping changes. It has

A	One over-all length in all sizes	23″
B	One coupling fit for all sizes	1⅛″
C	One dimension end from suction to centerline of discharge	4″
D	One bolt size for holding pumps to bases	½″
E	One bolt spacing for holding all pumps to bases	
F	One spacer coupling length for all sizes	3½″

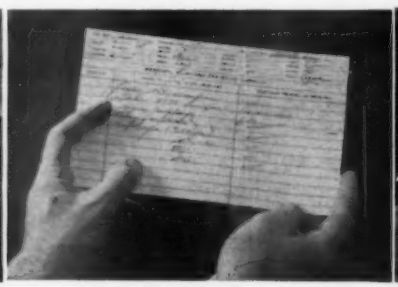
Back pull-out design lets you easily replace parts most subject to wear without disturbing pipe connections or motor mountings. For full information, write for Bulletin 725.1.

How to dewater a flood

Deep in a Virginia mine, water that could fast become a flood is being pumped out at as much as 8000 gpm for New Jersey Zinc Company.

More than a generation of miners has grown up since the first of the pumps started working. Yet these pumps, as well as the newer ones, perform so dependably that four more are slated to join them.

All 30 are Goulds single-stage, double-suction centrifugals. All use mechanical seals. All are grease lubricated.

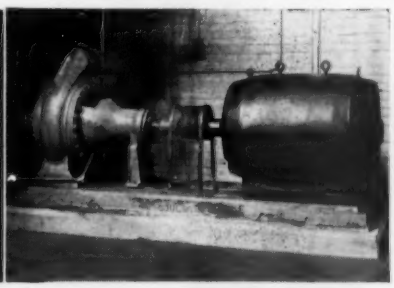


Easy way to diagnose pump failure

Keep complete maintenance records on easy-to-use cards. Failures show chronologically, making it easier to get at the root of the trouble.

Cards are a help in ordering new parts, scheduling lubrication, and in determining pump suitability for new requirements due to process change.

Like a free supply of these pump maintenance record cards? Drop us a line. For information on this, or other products on this page, write Goulds Pumps, Inc., Dept. OGJ-81, Seneca Falls, N.Y.



Unique-alloy pump fights abrasives

The first pump in the system at Bestwall Gypsum Company's Pryor Mill works on a particularly tough service. It must handle bits of metal and glass the junk remover doesn't get.

It's a Goulds Model 3139 constructed of ISO-40.* This stainless steel alloy, highly resistant to corrosion and abrasion, has BHN hardness of 320 and tensile strength of 140,000 psi.

Do you have a similar severe application problem? Let us know. ISO-40 is available in several of our designs.

*Registered trademark of Empire Steel Castings, Inc.

GOULDS PUMPS

NOW WITH
POLARIZED
ADDITIVE
Greater "Clinging" Power for Increased Thread Protection!
Jimmie Gray®
"500 TON"

Used on more wells throughout world-wide drilling industry!

SOLD ONLY THROUGH SUPPLY STORES
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USE JIMMY GRAY DOPE BRUSHES
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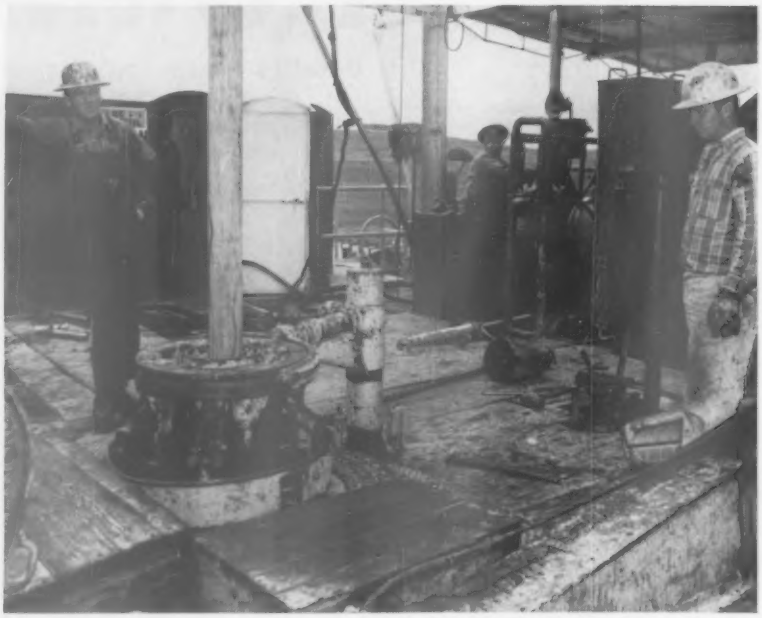
Among the Drilling Contractors



On its way

. . . to a proposed depth of 22,000 ft., Parker Drilling Co. of Tulsa Rig 66 is making hole below 15,371 ft. If it reaches objective it will be the state's second-deepest venture. Test is Continental Oil Co. 1 North Corn unit, SE SE SW 19-11n-14w, Washita County, Oklahoma. State's deepest probe was Shell Oil Co. 5 Rumberger in Elk City field which went to 24,002 ft. in 1959. Power slips in the foreground are Kelley Model J-6 Regular, manufactured by Ben F. Kelley Co., Inc., Tulsa. Similar-type slips were also used on the depth-setting 5 Rumberger.

15,000-ft. wildcat drilling in W. Va.

THE APPALACHIAN gas play is largely responsible for the quickened activity in the East. Mounting interest is stimulating deeper drilling.

Recently, Phillips Petroleum Co. decided to move a big rotary to the cable-tool country. Formerly working in South Louisiana, the drill has a rated capacity depth of 22,000 ft.

Moving the giant rig to the northern sector of West Virginia near Morgantown was a challenge in logistics.

Huge river barges were used for the first leg of the journey. Up the Mississippi they went to the Ohio River and up the Ohio to Kanauga, Ohio. At this point the Kanawha River empties into the Ohio. Barging up the Kanawha to Charleston, W. Va., the equipment was offloaded to trucks for the remainder of the trip to Morganstown by road. Using a 24-hour shuttle-truck system, 30 truckloads in all were required to haul the drilling components to the well site.

Alternate routes were possible. This could have been done by continuing up the Ohio to Wheeling, W. Va., or continuing farther up to Pittsburgh. At the latter point it would have been possible to barge up the upper Monongahela River with smaller barges capable of negotiating the smaller locks. Because of high water due to flooding and with adequate unloading docks at Charleston, the quicker overland route from the capital city was chosen.

The big unit is powered by electric generators driven by four diesel engines. The factory-new diesels were delivered to the well site in a

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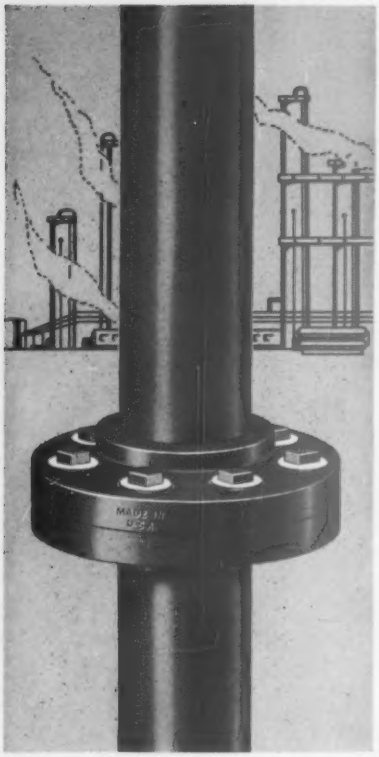

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separate shipment directly from the manufacturer.

Geological prospect. The slated test is in the Bunners Ridge area in the southeast corner of Marion County, West Virginia. It is 12 miles south of Morganstown and roughly 5 miles southeast of Fairmont, near the Marion-Taylor county line.

Exact location is 5,750 ft. north of 39° 25′ N lat. and 3,325 ft. west of 80° 0′ W long., which is 450 ft. from west line and 250 ft. from north line of the Russell R. Finch 61-acre lease.

Named the Phillips 1 Finch "A," the test is slated for the Cambrian at 15,000 ft. The site was chosen on the basis of geological work done by Phillips and is called the Neel prospect. Nearest production is at South Summit field 26 miles to the northeast in Fayette County, Pennsylvania.

Phillips is no stranger to this part of the nation. It has been active in searching for gas in the Appalachians and this general area for several years. Phillips believes this is the largest rig working east of the Mississippi River and north of the Mason-Dixon Line.

Kansas basement rocks featured in new book

A NEW PUBLICATION which tells the depth of the basement rocks in all parts of Kansas is recently off the press. Entitled "Wells Drilled Into Precambrian Rock in Kansas," the data were compiled under the auspices of the State Geological Survey of Kansas and coauthored by Virgil B. Cole, Daniel F. Merriam, Paul C. Franks, William W. Hambleton, and Paul L. Hilpman.

It should prove of value to drilling contractors, geologists, and operators working in the Sunflower State. Not only is there a composite stratigraphic column of rocks present in the state, but the works also includes a structure map contoured on the top of the Precambrian.

More than 2,100 wells have penetrated the Precambrian basement rock complex which is within about 600 ft. at the shallowest depth in the northeastern part of the state and at about 9,500 ft. in the southwestern part of the state.

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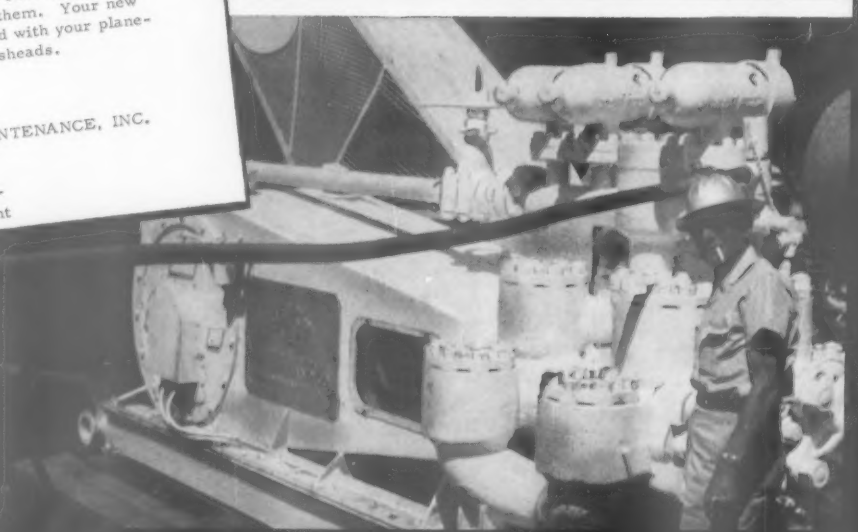

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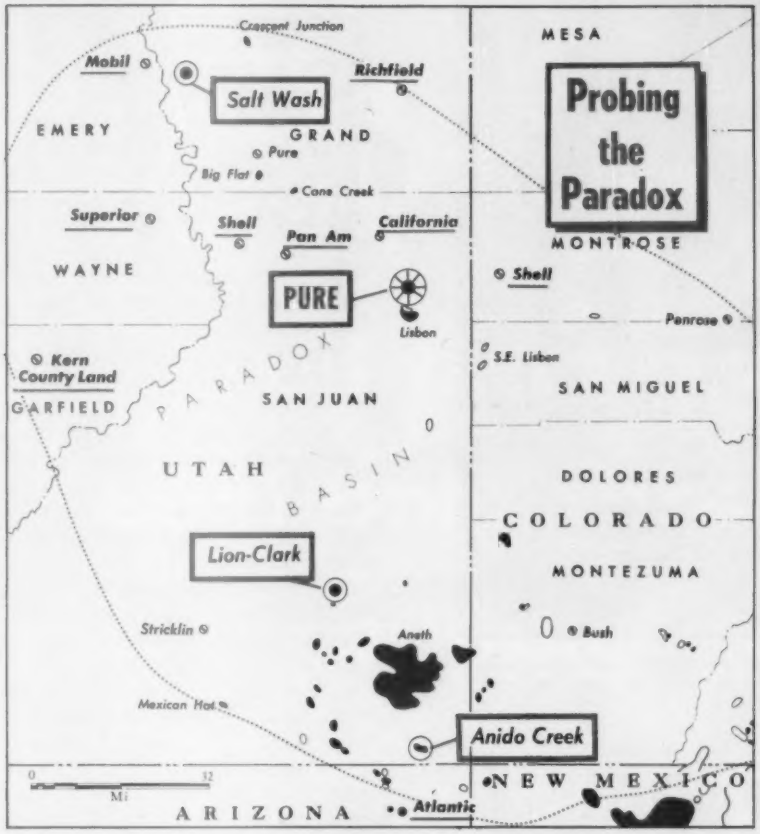

THIRTEEN IMPORTANT WILDCATS are now drilling in all parts of the Paradox basin. So far this year, four new fields have been discovered: Anido Creek, Lion-Clark (unofficial name), Salt Wash, and the newest—Pure 1 Big Indian-USA. The successes, as well as the attempts, span the entire length of the basin, as this map shows.

Northern Paradox basin grabs wildcatter interest

BY FRANK J. GARDNER

WHEN the original sketch for this map was made, emphasis in this column was to have been on superstition. Thirteen rank wildcats were chewing away in the Paradox basin—if 13 is a lucky number (we were **going** to say), then surely we'd see some hits in the basin this month.

But before we finished the map, 1 of the 13 paid off. And the column had a new theme.

At its 1 Big Indian-USA, Pure Oil Co. released testing details that definitely mean a new field for San Juan County, Utah (OGJ, July 31, 1961, p. 107). Lying 2½ miles northeast of Lisbon field (No. 1 exploration newsmaker of 1960), this strike flowed gas and condensate from Mississippian rocks between 9,959 and 10,139 ft. Pure is drilling now below 10,500 ft. looking for the Devonian; location is in Section 33-29s-24e. Lisbon field produces from Paradox salt, Mississippian, and Devonian-McCracken, at levels about 2,000 ft. shallower than pay levels indicated at Big Indian.

Pure has been a pioneer in deep Paradox exploration, having found Big Flat field in Grand County, Utah, in 1957 to nail down the first Mississippian production in the basin; at Lisbon, the company brought in the first basin Devonian production and first Paradox salt production. At the moment it has only one other wildcat on the scout reports for this region, and it could be a significant one; the 5 Big Flat unit lies in Section 27-25s-19e, about 2½ miles north of Big Flat production.

A race against time. In drilling the new discovery, Pure was racing against lease expiration time on its federal lands. As a matter of fact, it lost one 40-acre tract in the northeast quarter of the same section in which the Big Indian strike lies; this suddenly has become the most popular piece of real estate in the United States, as more than 2,500 applications were filed on the tract when the lease expired. Pure, along with Pubco Petroleum Co., controls most of the acreage near the new discovery, however.

Important as it is, the Big Indian well could be overshadowed by success at any of the other remote wildcats shown on the map. Significantly, 10 of the 13 tests are major-company operations. Even more significantly, 10 of them lie in the northwestern half of the egg-shaped Paradox basin. There is no concentration of interest, for the entire basin periphery is peppered with wildcats. The recent (May 1961) discovery at Salt Wash, on the far-northern rim of the basin, demonstrated that exploration boundaries know no limits in this vast oil bowl.

Progress of the remaining 12 wildcats will be followed closely by Paradox observers; some are now nearing critical levels, others just beginning. If precedent means anything, we can expect at least one more success out of this many operations. Whether it be Richfield on the north, Penrose on the east, or Kern County Land on the west, Paradox can be expected to grow ever greater as a source of new oil and gas.

ALTHOUGH much of the activity in Rio Arriba has been on acreage farmed out from majors, Mobil is the first major to enter the play.

New targets sought in revived Four Corners activity

BY KENNETH CHASTEEN
Albuquerque, N. M.

THE EASTERN part of San Juan basin and the western portion of Chama basin in central Rio Arriba County, New Mexico, combine to be the currently "hottest" spot in the Four Corners area. Activity is increasing daily as operators hurry to capitalize on summer in this area known for its poor roads and hard winters.

Leasing activity, along with farmouts, has risen sharply in the area and privately owned land is bringing from $5 to $10 bonus per acre. Some smaller tracts near production or indicated discoveries have reportedly brought up to $25.

Some 11 exploratory ventures are currently drilling, are in the process of completion, or have been staked in this area which stretches more than 35 miles north and south.

Production found thus far has been relatively shallow, above 4,000 ft., and has, in most cases, been limited to fractured shales. However, several strata have been opened to production including upper and lower Gallup, Niobrara, Tocita, Sanastee, Mancos, and Morrison.

Ranging from Township 24 North through 31 North at the present time, the play shows signs of spreading both east and west.

Discovery of the Puerto Chiquito field in January 1960 by Intex Oil Co. kicked off interest in this portion of Rio Arriba County, which many had thought to be too far up out of San Juan basin to produce.

Finaled from the Niobrara open hole at 1,785-1,958 ft., Intex's 1 USL-Alto completed on the pump for 128 bbl. oil daily at its spot in C NW NE 5-26n-1e.

Development in early 1960 quickly accounted for Tocito oil in C SE NW 9-26n-1e, lower Gallup, 1,976 ft. from the north line and 593 ft. from the east line of 16-26n-1e as well as 1,975 ft. from the south line and 485 ft. from the east line of 21-26n-1e, Sanastee, in C NE NW 27-26n-1e, and upper Gallup in C NW SW NW 10-25n-1e.

April 1961 saw a Gallup confirmation finaled 1,450 ft. from the north line and 430 ft. from the east line of 6-26n-1e as well as several dry holes which apparently marked the field as a long, but narrow multipay area.

Severe winter halted operations at three discoveries along the play in 1960, but it was the already indicated results of these rank wildcats which accounted for the present drilling surge.

These were the R. L. Bayless and P-M Drilling Co. 1 Taylor-Morgan, finaled in May 1961 for 87 bbl. per day from Gallup open hole at 4,150-4,429 ft. in C NE NE NE 15-28n-1w; the Lemm & Miatico 1 Arellano, testing on the pump as a Mancos opener 1,963 ft. from the north line and 1,980 ft. from the east line of 5-24n-1e, and the Great American Oil Corp. 1 Sargent, shut in awaiting pipeline connection as a Morrison gas discovery in 19-31n-3e.

The current activity surge is being paced by the Lemm & Miatico 1 Arellano at which potential test is expected at any time. Latest gage on the pump was 10.6 bbl. per hour natural.

The wildcat is 6 miles south-southwest of multipay Puerto Chiquito field, which divides the current play area, and production is from open hole at 4,390-4,414 ft.

Total depth is 4,414 ft. at the venture on which operators called Mesaverde at 1,764 ft., Point Lookout at 2,893 ft., Mancos at 2,999 ft., Gallup silt at 4,203 ft., base Gallup silt at 4,327 ft., and Lower Mancos at 4,390 ft.

Lemm & Miatico also have cable tools operating below 950 ft. at the 1 Western Development-Government as a confirmation attempt to the above discovery. Drill site is in C W½ SE SE 5-24n-1e.

Moving north along the play area, R. L. Bayless, of Farming-

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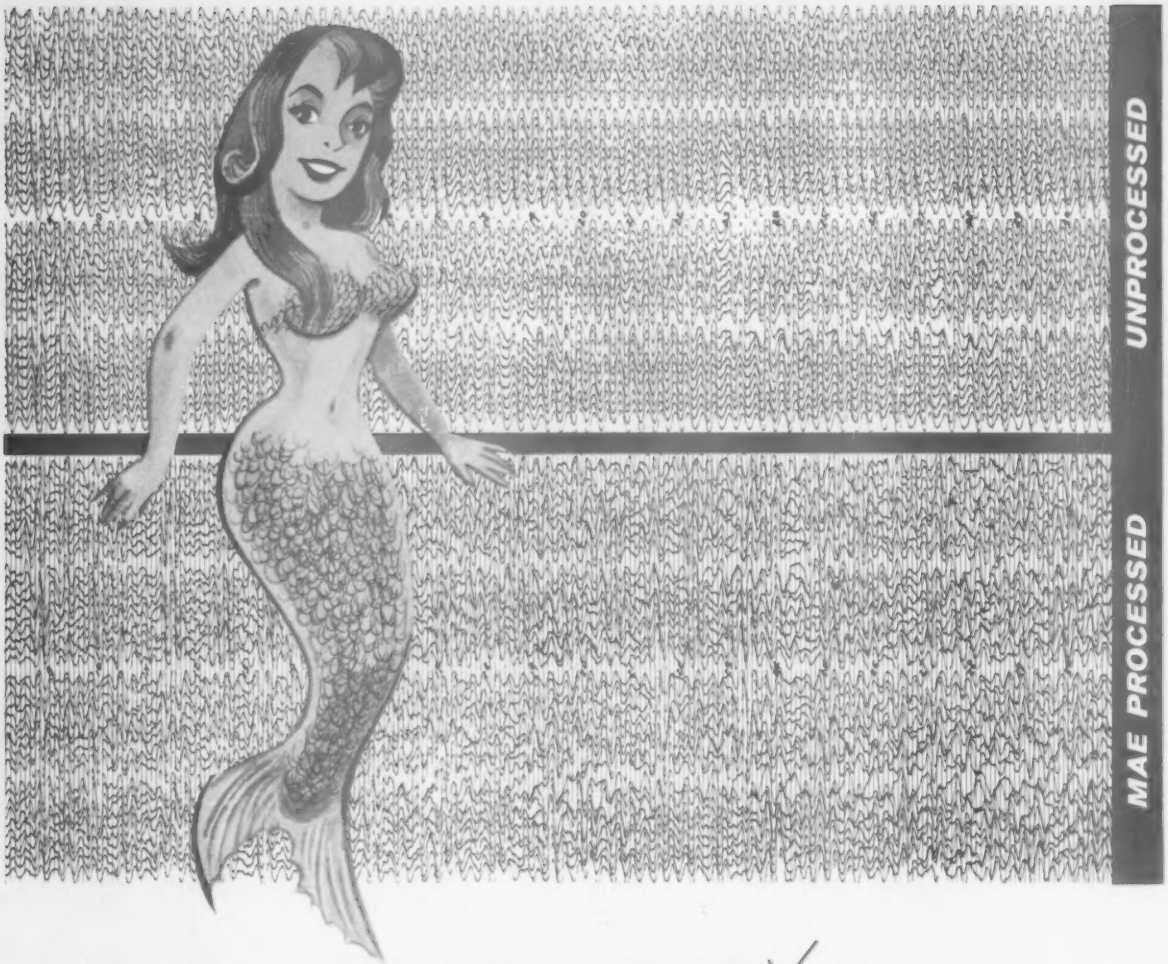

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ton, has staked the 1 Betsy as a 1,900-ft. Gallup wildcat. Elevation is 7,054 ft. at ground level on the drill site 471 ft. from the south line and 660 ft. from the east line of 29-27n-1e. The venture is a half mile northwest of nearest production in Puerto Chiquito field.

Pump tests continue at one of the most easterly wildcats thus far in the play area.

Tamanaco Oil is testing the Sanastee open hole after a fracture treatment at 1,422-48 ft. in its 11-N El Pasos Ranch. Prior to treatment at the venture 680 ft. from the south line and 2,080 ft. from the west line of Section 11-28n-1e, the test was swabbed for 15 to 20 gal. oil per hour.

Total depth is 1,448 ft. at the indicated discovery and the firm reported a 1,435-ft. Sanastee top from ground-level elevation 7,230 ft.

Tamanaco has come 3 miles southwest of its indicated Sanastee opener to stake the 27-B Pound Ranch as a 1,600-ft. Dakota try. Site is 330 ft. from the north line and 1,501 ft. from the east line of 27-28n-1e, and is 7 miles northnortheast of the Puerto Chiquita area.

Although much of the activity in the play area thus far has been on acreage farmed out from major oil companies, Socony Mobil is the first major to officially enter the play.

Mobil First

Mobil has announced location of the 12-14 Boulder as a southeast offset and confirmation attempt to the Bayless and P-M Drilling 1 Taylor-Morgan, recent Gallup oil discovery. This pool opener was drilled on a Standard of Texas farmout with other majors contributing.

Location of Mobil's drill site is 1,750 ft. from the north line and 1,950 ft. from the west line of 14-28n-1w.

Farmington oil field and general-construction contractors, Foutz & Bursum, have entered the play with 1 Bayless-Whigham spotted in C NE NE NE 27-28n-1w.

The proposed 5,000-ft. Gallup wildcat has an elevation of 7,190 ft. on the ground at its site 2 miles due south of the Bayless and P-M discovery.

Pump repairs are under way at the Aztec Oil & Gas 1 Boulder Lake 1,850 ft. from the south and west lines of 13-29n-1w.

Bottomed at 3,256 ft. the wildcat has been cased to 2,479 ft., perforated at 2,284-2,330 ft., and fractured for a completion attempt; however, load oil was still being returned when pump failure occurred.

Aztec has also set a string of production casing at its 1 Stinking Lake 875 ft. from the south line and 970 ft. from the west line of 35-29n-1w. Drill site is 4 miles southwest of the 1 Boulder Lake and 2 miles north of the discovery by Bayless & P-M.

Total depth at this new production prospect is 4,121 ft. and 7-in. has been cemented to 4,120 ft. with 40 sacks. Elevation is 7,713 ft. on the ground and no tests or cores were taken.

Logging was under way the middle of July at total depth 3,565 ft. in the Kingwood 1 Jicarilla.

Spotted 530 ft. from the south line and 660 ft. from the west line of 23-30n-1w, the venture was drilled from a 7,823-ft. ground elevation and is currently the most northwesterly venture in the play area.

The northeastern extremity of the play is the Great American Oil Corp. 3 Sargent to be drilled 2,380 ft. from the south line and 1,980 ft. from the west line of 32-1n-2e of the Martin & Border Survey in the Tierra Amarilla grant. This corresponds with USGS Section 18-31n-3e.

This 1,000 ft. Morrison venture will be drilled as a northwest offset and confirmation attempt to the firm's No. 1, a Morrison gas discovery.

With at least 3 more months, and possibly 4 before winter hits the area again, to expand operations this year, activity should continue brisk in this relatively unexplored part of northern New Mexico.

Independents and majors alike are hoping the search will uncover a general sand to rival Bisti, Cha Cha, Verde, and Horseshoe Gallup fields so porous and productive along the southwestern part of San Juan basin.

Oklahoma bags its third two-state oil field

A new oil field in the Oklahoma Panhandle gives the state its third producing area straddling state lines. New Southeast Dower basal Morrow Pennsylvanian field in Beaver County has a July allowable of 113 bbl. per day, equal the Texas rate.

The discovery well is Mobil Oil Co. 1 Ed Kelly unit, SW SW 35-1n-21eCM. Production is at 8,200 ft.; field is on 80-acre spacing. All three of the line-crossing fields in Oklahoma are on the Texas border. First such pool was Sivells Bend-Strawn in Love County in the south portion of Oklahoma with production at 6,570 ft. The July allowable there was 31 bbl. per day. The other field is also in Beaver County in the Panhandle at Northeast Camrick-Morrow. Production is at 7,429 ft.; a July allowable of 42 bbl. per day was granted this one.

Deep Norris well completed in Oklahoma's Arkoma basin

A dual completion is reported at Frankfort Oil Co. 1 Hulsey in NW NW SE 18-6n-22e, on the western side of Norris Deep field, Latimer County, Southeast Oklahoma

The well flowed 18,400 M.c.f.d. from Red Oak Pennsylvanian perforations at 6,803-6,926 ft.; 9 M.M.c.f.d. from Spiro Pennsylvanian at 11,660-11,707 ft.

Cartersville. Humble Oil & Refining Co. will drill its second Le-Flore County wildcat near shallow Cartersville field, 2 miles northeast of the new 1 Nelson discovery in C SE NW 18-9n-24e.

The new well will be 1 Burris, C NW SE 5-9n-24e. It will go to 6,000 ft. or Cromwell. The Humble Nelson discovery well flowed 2,900 M.c.f.d. from Spiro sand at 5,424-86 ft. First offset to Brent pool in southern Sequoyah County was announced by Humble. The 1 Jackson unit, C NE SE 33-11n-24e, will offset the 1 Williams discovery in C NW SE 5-10n-24e. That Cromwell well flowed 3,165 M.c.f.d. Depth will be to 3,000 ft. in the new offset try.

Exploration Outlook

More than two score rigs are turning in two Oklahoma counties

AN ATTACK on the multipay sands of South-Central Oklahoma's Cleveland and McClain counties is adding significant reserves to the already prolific oil coffers of this geologic "land's end." Wildcatters and field developers have 44 rigs going throughout the two-county area. Prime targets are the Ordovician sands, the Hart and Bartlesville sands, and the Hunton lime.

Eleven new discoveries

. . . and extension successes dot the Cleveland-McClain County sector. Six of these new wells are good Ordovician producers, the rest have Hunton, Bartlesville, and Hart production.

In Cleveland County, Monsanto Chemical Co. has a good producer at the fifth well in new South Corn field. The 1 Polk in SE SE SE 11-9n-3w flowed 29 bbl. of oil hourly through ¼-in. choke from Bromide sand at 9,618-35 ft. At Norman, Union Texas Natural Gas Co. has the fourth well in this field located just south of the city. The 4 Navy, SW NE SW 5-8n-2w, has production in the Bromide, McLish, and Oil Creek Ordovician sands.

In McLain County, Petroleum, Inc., hit at two wildcats. A two-pay discovery is reported south of East Newcastle field at 1 Thomas-B in C NW SE 24-9n-4w. The 1 Price unit in C SW NW 18-7n-3w, west of Washington field, had Bromide production. The Thomas well flowed oil from the Tulip Creek at

Wells like these keep South-Central Oklahoma's reserves up

Wells like these keep South-Central Oklahoma's reserves growing:

A. Petroleum Inc. 1 Thomas-B, C NW SE 24-9n-4w. Flowed 14-17 bbl. per hour from Tulip Creek at 10,012-016 ft. Second Bromide at 9,682-88 ft. made 72 bbl. condensate in 12 hours through 20/64-in. choke and 3 M.M.c.f.d.

B. Petroleum Inc. 1 Price unit, C SW NW 18-7n-3w. Flowed 8 bbl. per hour from Bromide through 20/64-in. choke at 10,783-87 ft.

C. Monsanto Chemical Co. 1 Polk, SE SE SE 11-9n-3w. South Corn field. Flowed 29 bbl. per hour through ¼-in. choke from Bromide at 9,618 ft.

D. Union Texas Natural Gas Co. 4 Navy, Norman field. Oil found in Bromide, McLish, and Oil Creek sands.

E. Trice Production Co. 2 Lindsay, C NW NW 17-10n-2w. Flowed 240 bbl. of oil per day through 18/64-in. choke from Hunton Siluro-Devonian at 7,395 to 7,506 ft. Flowed 150 bbl. per day through 18/64-in. choke from Bartlesville Pennsylvanian sand at 7,251 ft.

F. Jones & Pellow 1 McGrew, C NW NE 20-7n-4w, North Dibble field. Flowed 64 bbl. per day on ¼-in. choke from Hart Pennsylvanian sand at 9,727-55 ft. and 480 bbl. daily through 10/64-in. choke from the Osborn sand at 9,850-9,900 ft.

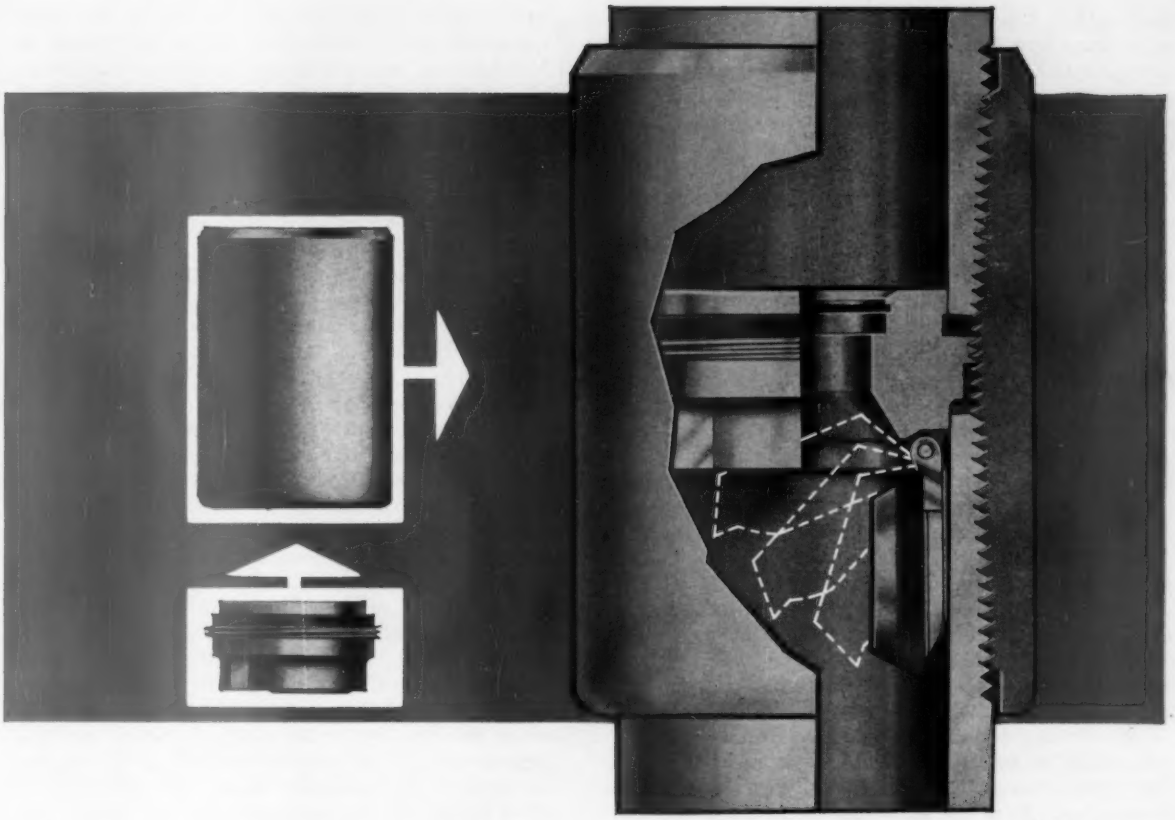
G. Cities Service Petroleum Co. 1 Ramsey, C SW NE 22-5n-4w. Flowed 136 bbl. condensate per day through 14/64-in. choke and 3,848 M.c.f.d. from Oil Creek perforations at 11,875-923 ft.

H. Fred Morgan 1 Owens, C SW SW 32-6n-2w. Flowed 338 bbl. of oil in 14 hours through 20/64-in. choke from upper Hart sand at 7,398-7,410 ft. and 2 bbl. per hour from lower Hart at 7,518-38 ft. Will triple complete in Hunton at 7,684-7,209 ft.

I. Sunray Mid-Continent Oil Co. 2 Clagg, C SE SE 22-5n-3w. Flowed 80 bbl. per day through 9/64-in. choke.

J. Gulf Oil Corp. 1 Webb-Simpson, C SE NE 22-5n-3w. Flowed 413 bbl. of oil in 13 hours through 20/64-in. choke.

K. Cities Service 1 McKee, North Lindsay pool. Flowed 3,518 M.c.f.d. with 49.1 bbl. condensate per million from Oil Creek sand at 11,952-11,998 ft.



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10,012-16 ft. through ¼-in. choke; 72 bbl. condensate in 12 hours with 3 M.M.c.f.d. from the second Bromide sand at 8,682-88 ft. The 1 Price flowed 9 M.M.c.f.d. and 20 bbl. of oil per hour on tests of the Bromide sands at 10,754-17,804 ft. Cities Service Petroleum Co. 1 Ramsey, C SW NE 22-5n-4w, North Lindsay field, flowed 136 bbl. condensate per day and 3,848 M.c.f.d. through 14/64-in. choke from perforations at 11,875-11,923 ft. in the Oil Creek sand. Open flow was 15,401 M.c.f.d. with 35 bbl. per million. This is an old well drilled deeper. Several older wells in this sector have been deepened lately, becoming prolific new Ordovician producers.

Other pays figure in the play

. . . in the Cleveland-McClain campaign. Although the Ordovician sands seem to be the most attractive targets in South-Central Oklahoma, the Hart and Bartlesville sands of Pennsylvania age, and the Hunton Siluro-Devonian lime are also on the firing line. Trice Production Co. completed 2 Lindsay in C NW NW 17-10n-2w in the extension area at Moore, Cleveland County, flowing 240 bbl. of 40°-gravity oil per day through 18/64-in. choke from Hunton perforations at 7,395-7,456 and 7,496-7,506 ft. The Bartlesville, second pay in the well, made 150 bbl. of 40°-gravity oil daily through 18/64-in. choke from a notch at 7,251 ft.

At North Dibble field, Jones & Pellow extended production to the west at 1 McGrew in C NW NE 20-7n-4w. This well flowed 64 bbl. per day through ¼-in. choke from the Hart sand at 9,727-55 ft. and 480 bbl. per day through 10/64-in. choke from the Osborn at 9,850-9,900 ft. Flint Creek field also is continually being expanded. Fred Morgan 1 Owens, C SW SW 32-6n-2w, flowed 338 bbl. in 14 hours through 20/64-in. choke from upper Hart sand at 7,398-7,410 ft. and 2 bbl. per hour from lower Hart at 7,518-38 ft. A triple completion was made with the Hunton as the third pay. Three other wells are being worked by this operator here. Sunray Mid-Continent Oil Co. 2 Clagg, C SE SE 22-5n-3w, on the south side of East Payne field, flowed 80 bbl. per day on 9/64-in. choke from Hunton at 7,933-49 ft. as this area begins a revival program. Goff-Leeper and Wood Oil Co. are busy at East Payne also. Gulf Oil Corp. 1 Webb-Simpson, C SE NE 22-5n-3w, flowed 413 bbl. of oil in 13 hours through 20/64-in. choke, also from Hunton.

This is a popular area

. . . for the oil-hunter. Thick Ordovician sands have always been a lucrative target in southern Oklahoma and in the Norman-Purcell areas. Recovery from the Ordovician is expected to be 10,000-15,000 bbl. or more per acre. The area has a strong water drive. The deep-drilling costs are absorbed to a great extent by the expected good recoveries. This area is full of "bumps." Some of them are small, but they appear to be widespread. Some of them are proving to be good oil fields . . . Norman, North Dibble, the Payne areas, and South Corn. Geologically, the area presents a challenge. A large number of faults exists. The north part of the area lies on the southern end of the Oklahoma City uplift, the western part lies on the extreme east edge of the Anadarko basin, while the southern end is situated on the north flank of the Pauls Valley uplift. This in-between exploratory plat holds many future oil fields for Oklahoma.

—John C. McCaslin

Deep Wilcox discovery in Bee County, Texas

One of the most important discoveries of the year in South Texas is Union Producing Co. 6 N.P.U.-Ray in Bee County's Tulsita-Wilcox field. The well was completed flowing 6,800 M.c.f.d. from perforations at 13,525-45 ft. by Gamma Ray or 13,512-32 ft. by electric log.

Bottom-hole shut-in pressure was 10,708 psi. and maximum flow rate reported on the back-pressure test was on 16/64-in. choke; rate of 5,382 M.c.f.d. with tubing pressure at 3,890 psi.

Location of this deep new Wilcox find is in the W. J. Porter Survey, A-529, about 3 miles northeast of Pettus, Texas.

Jackson County. A prolific gas discovery was completed in Jackson County, 5 miles northeast of Edna. The well is Tobin & Begeman 1-A George S. Gayle estate. It flowed 128 M.M.c.f.d. on open flow potential from basal Frio sand plus 10 bbl. condensate per million. Pay is at 6,176-78 ft. Location is 1 mile northeast of Welsh Oil & Gas Co. 1 Gayle, a 5,700-ft. Frio discovery completed earlier. Spot is in Job Williams Survey, A-85.

Gas well finished on west side of Ramos, La.

A gas well has been completed on the west flank of Ramos field in St. Mary Parish, South Louisiana. The well is British-American Oil Producing Co. B-1 Avoca, Inc. in 45-16s-13e.

The well flowed 2,200 M.c.f.d. with 10 bbl. condensate and 0.10% b.s. and w. Flow was from a 9-ft. pay sand at 10,123 ft. Location is northwest of 1 Whitney National Bank and southwest of Jett Drilling Co. 1 Kurzweg.

Jefferson Parish. Texas Pacific Coal & Oil Co. dually completed a wildcat in 2-16s-23e. The 1 Anaise Christen flowed 143 bbl. of 32.5°-gravity oil per day through 8/64-in. choke from perforations at 11,816-26 ft. A 6-hour gage of the upper zone at 11,680-11,700 ft. got 2,800 M.c.f.d. with 78 bbl. 54°-gravity condensate. Test was on 12/64-in. choke.

Good gasser reported in Goliad County, Texas

A well off the west side of Dial field in Goliad County, South Texas, flowed 11 M.M.c.f.d. The well is James G. Brown 1 Mrs. Fannie Ray Pereira, 7 miles southwest of Charco in the V. Ramos Survey, A-241.

The well is producing from 8,496-8,522 ft. Luling is the pay sand in the field. The new well is also Luling Wilcox.

Pennsylvanian gas discovery finaled in New Mexico

Pennsylvanian gas production is reported at an Eddy County wildcat in southeastern New Mexico, 11 miles northwest of Carlsbad. The

well is Gulf Oil Corp. 4 Seven Rivers Hills unit in 4-21s-25e, 6 miles southwest of McMillan field.

The well flowed 1,305 M.c.f.d. on potential test through 21/64-in. choke from perforations at 10,096 ft. Total depth is 10,785 ft. Casing is set at 10,213 ft. Location is in the west-central part of Eddy County.

Michigan's St. Clair wildcat will get production test

In Michigan, Fain-Porter Drilling Corp. 1 Neuman, NE SW NE 18-7n-13e, remote wildcat in St. Clair County probably will be cased at 4,760 ft. for production test in Niagara reef section. Wildcat carried a gas show.

McClurex & Hartman 1 Gill, SE NE SE 29-4n-15e, St. Clair, located 1 mile north of the east end of the Boyd gas and oil pool, swabbed 10 to 15 bbl. of oil per day from 2,656 to 2,659 ft. after 250-gal. acid treatment and will be retreated with bigger shot.

Benedum Trees and Howard Atha 1 Pattee, NE NE SW 28-17n-7w, Osceola County, a wildcat, swabbed 2 bbl. of oil per hour over 7-hour test after 250-gal. acid treatment to Dundee section pay at 3,864-67 ft. Operators will set pump for additional testing on the central basin outpost.

Luther Hill field in Ellis County, Oklahoma extended

Luther Hill field in Ellis County, Northwest Oklahoma, was moved 2 miles east at Falcon Seaboard Drilling Co. 1 Phillips, C SE NW 13-24n-24w.

The well flowed 3,800 M.c.f.d. on ¾-in. choke during a 1-hour blowdown test from perforations in the Chester Mississippian at 7,802-20 ft. Flow tubing pressure was 225 psi.

New success reported in Ohio Clinton development

Another success in the play developing in northwest Tiverton Township, Coshocton County, has been reported by Clinton Oil Co.

In an 8-hour test after fracture, the 1 L. W. Hawkins, Section 3, made 150 bbl. of oil. Gaged gas flow was 145 M.c.f.d. The Clinton sand was logged at 3,318-39 and 3,354-64 ft. and had 15 bbl. natural.

Also, in the same area, preliminary reports indicate a good gasser on 1 R. P. Putnam, Section 4. It had a natural gage of 726 M.c.f.d. and a 12-hour rock pressure of 950 psi.

Arkoma's Northwest Kinta extended to the southeast

Northwest Kinta field in Haskell County, Southeast Oklahoma, was moved 1 mile southeast at Apache Corp. 1 Cox-Rushing, C NE SW 25-8n-19e.

The Arkoma basin well flowed 4 M.M.c.f.d. from perforations in the basal Atoka Pennsylvanian at 5,820-27, 5,839-49, and 5,858-62 ft. In Kinta field itself, E. G. Rodman 2 Scott, C NW 34-8n-20e, flowed 2 M.M.c.f.d. during tests at 5,990 ft.

Oklahoma Panhandle. Sinclair Oil & Gas Co. 1 Allen unit in C NW SE 33-4n-24eCM, Camp Creek field, Mocane district, Beaver County, flowed 5,972 M.c.f.d. on ¾-in. choke from Permian Council Grove perforations at 3,280-3,339 ft.

Pan American Petroleum Corp. 1 Lockhart unit in C SW NE 13-26n-21w, Lovedale field, Harper County, flowed 14 M.M.c.f.d., calculated open flow, on completion. Pay is the Tonkawa Pennsylvanian sand at 5,036-40 ft.

Remote wildcat slated for deep Lower Cretaceous area

Shell Oil Co. will drill to 14,500 ft. at a deep Lower Cretaceous wildcat in central Polk County, Texas. The wildcat will be drilled 13 miles northeast of Livingston in an area with no production. It is a projection of the Lower Cretaceous play that Shell recently developed in Bee County, South Texas. The new wildcat will be the 1 Southland Mills on the James Reavis Survey, A-507.

Colorado. Crescent Oil & Gas Corp. 15 L. E. Brownson "A," Garwood field, flowed 19 M.M.c.f.d. from 3,600-ft. Frio perforations at 3,745-47 ft. on absolute open flow. Location is in the E. S. Wooly Survey, A-584, 15 miles west of Garwood.

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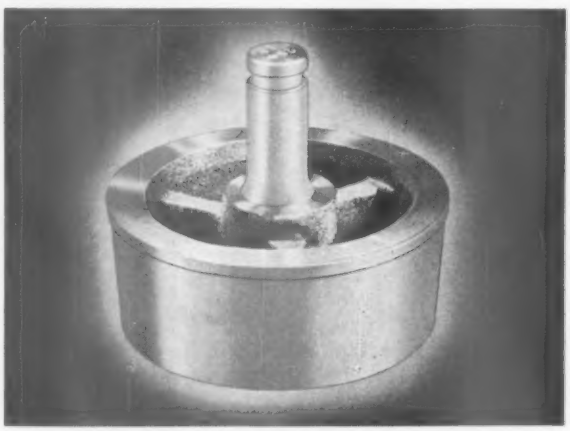

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Big Hill field. Adams & Haggarty completed a flowing oil well in this Jefferson County field. The 9 Mary E. Fitzhugh et al. flowed 89 bbl. of oil per day from perforations at 5,643-57 ft. Flow was on 7/64-in. choke. Location is 8 miles southeast of Winnie in the Stephen Eaton Survey, A-22.

Chat play develops in Garfield-Noble, Okla.

A Mississippi chat play is developing along the Garfield-Noble County line in northern Oklahoma.

Mohawk Drilling Co. 1 Carnahan, C NW SW 31-23n-2w, Noble County, flowed 10 bbl. of oil per hour and then 5 bbl. per hour on ⅜-in. choke. This well adds a second producer to the deep play beginning in shallow Northwest Antelope pool. It also extends the Noble area into Garfield County. Similar production was opened recently in Southeast Barnes field.

The Mississippi Chat well, 1 Carnahan, had perforations at 4,710--17 ft. Apache Corp. indicated the third well in the area at 1 Goff, C SE NE 36-23n-3w. It flowed oil on test at 4,730-74 ft.

Dual gasser born from East Texas workover well

An old well worked over in Shiloa field, Rusk County, East Texas, turned into a dual gas producer. The well is Atomic Oil & Gas Enterprises 1 Orr-Tipps Gas unit in the B. A. Vansickle Survey, A-796, 3 miles northeast of Minden in the eastern part of the county.

From Rodessa perforations at 6,079-88 ft. the well had a calculated open flow of 2,600 M.c.f.d. plus 13 bbl. condensate per million. From Travis Peak at 7,231-39 ft. the well had a calculated open flow of 1,250 M.c.f.d. plus 13 bbl. condensate per million.

The original well here was Hughey & Perryman 1 Wood Orr Gas unit, drilled to 7,300 ft. in 1960.

Hitts Lake. Sun Oil Co. opened a new pay for Hitts Lake field, Smith County, at 1 Marsh-Frazer unit, John Lane Survey, A-557, 7 miles north of Tyler. The well flowed 306 bbl. per day on 10/64-in. choke from Rodessa perforations at 9,305-20 ft. Location is on the south side of Paluxy oil in Hitts Lake field

Yegua oil discovery finaled in Lavaca County, S. W. Texas

A 6,000-ft. Yegua oil discovery was completed in eastern Lavaca County, 5 miles north of Provident City, Southwest Texas. The new producer is Christie, Mitchell & Mitchell 1 Lewis Allen in the eastern corner of the county.

This Yegua oil find flowed 143 bbl. of 33.5°-gravity crude per day on ¼-in. choke through perforations at 6,028¼-33 ft. Location is in the B. Noble Survey, A-346, near the Colorado County line. Name recommendation is Allen 6,000-ft. Yegua field. This well is a southwest extension of 6,000-ft. development at Northwest Garwood in Colorado County by the same operator. The Garwood area is 2-3 miles from the new discovery.

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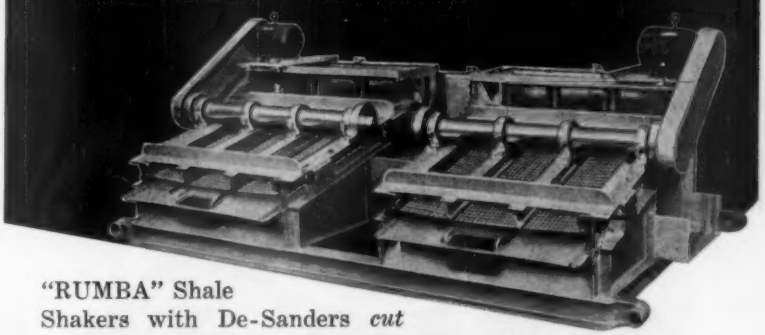

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well for Goliad County will be Rehler-Carlson & Associates 1 G. and A. Bluntzer in Melrose field on the James Cunningham Survey, 5 miles southwest of Weesatche.

The well will be completed in Mackhank, Luling, Reklaw sands. There is also Slick production at 7,638-47 ft., but it will not be produced now. Completion will be made through two strings of 1½-in. tubing inside of 5½-in. production casing with Mackhank to produce from 7,869-73 ft., through one string of tubing, the Luling from 7,778-86 ft. in the second string, and the Reklaw through casing annulus from 7,638-47 ft. All three zones will test gas-condensate, according to reports.

Matagorda County. Monsanto Chemical Co. completed a gas-condensate discovery 1 mile south of El Maton in Matagorda County, Texas Gulf Coast.

The 1 Madsen flowed 1,430 M.c.f.d. plus 110 bbl. of condensate daily through small choke. Pay is Frio perforations at 9,563-76 ft. Location is in Pumphrey Burnett Survey, A-12. Nearest production is 1 mile north in El Maton field.

Northwest Okeene field linked with Oklahoma's North Homestead

Northwest Okeene field, Blaine County, has been linked with North Homestead field in Major County, northwestern Oklahoma. The link-up well is Pan American Petroleum Corp. 1 Blankenship in C SW NE 4-19n-11w, Blaine County.

The well flowed 22 M.M.c.f.d. on 5-hour test through ¾-in. choke from Chester Mississippian lime at 7,361-7,442 ft.

Another linkup. Pure Oil Co. 1 Schlarb, C SW NE 22-22n-16w, Major County, linked Cedardale field with South Campbell field to the northeast. The well flowed 6 M.M.c.f.d. on 5-hour test through ¾-in. choke from perforations at 6,301-12 and 6,315-38 ft.

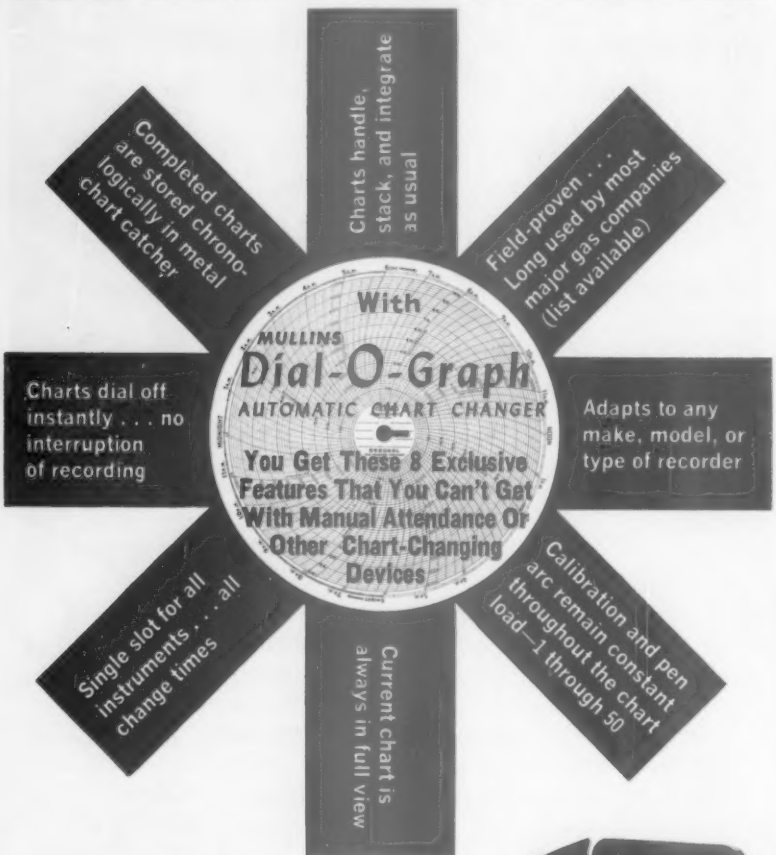
Arkoma taps gas near Fort Smith, Ark.

GAGE IS REPORTED on a new gas discovery ½ mile east of Fort Smith, Ark. Athletic Mining & Smelting Co. 1 C. P. Wilson, SE¼ 12-8n-32w, Sebastian County, western Arkansas, flowed 3,150 M.c.f.d. from Hale perforations at 5,880-5,936 ft. Flow was 250 M.c.f.d. from upper Alma perforations at 2,009-23½ ft.

This new Arkoma basin wildcat is 3 miles west of Hollis Lake field and 1¾ miles northwest of Massard field.

Other Arkoma activity. New starts in both wildcatting and development are reported. Steve Gose will drill to 7,100 ft. at 1 Kelly unit, NE SE NW 27-8n-18e, Pittsburg County, Southeast Oklahoma. Location is 2 miles northeast of Apache Corp.'s deep gas find in 4-7n-18e.

Gose will drill 1 Harper unit in NW NW SE 5-7n-18e, a confirmation try to the Apache discovery on the west. Ambassador Oil Corp. will drill a 9,500-ft. Wapanucka test at 1 James unit in C NW 24-5n-18e. There are already two gassers in new Wilburton field, one in Sections 22 and 23. Pan American Petroleum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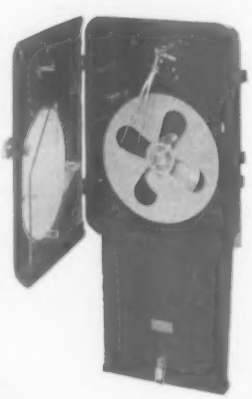

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Corp. 1 Martin, SE SE NE NW 20-6n-22e, is a new well to be drilled in the south portion of the deep area at Red Oak-Norris, northeastern Latimer County.

Arkansas well opens gas pay in Scranton field

A new-pay discovery for Scranton field in southern Johnson County, Northwest Arkansas, is Gulf Oil Corp. 1 McAlester Fuel Co. in C NW SE 31-9n-24w. The well flowed 1,750 M.c.f.d. on ¾-in. choke from perforations at 3,006 ft. in lower Carpenter sand of Atokan Pennsylvanian age.

Gulf is swabbing load after killing the well. It also produces at 4,472 ft. in Areci sand. This well made 330 M.c.f.d. Discovery well was J. M. Huber Corp. 1 Mabry, 6-8n-24w, Logan County.

Shallow play may tee off in Southwest Michigan

In Michigan, C. A. Perry and Son, Inc.. 1 Kaminski, NE NW SW 26-7s-15w, Jefferson Township, Cass County, may set off a 700-ft. shallow Traverse play in extreme southwestern Michigan, although Perry has decided to deepen to the original 4,000-ft. Trenton-St. Peter objective.

Two followup locations by other independents have been staked, one an offset, and at least four other immediate starts in the close-in area are scheduled. Perry tested for 3 days, recovering 90 bbl. oil at 710 ft., and then moved rotary back over hole and is drilling ahead.

• Benedum Trees Oil Co. 1 Pattee, NE NE SW 28-17n-7w, Orient Township wildcat, Osceola County, swabbed 17 bbl. oil in 3½ hours from Dundee at 3,864-67 after 250-gal. acid treatment and was shut in pending setting of pump unit.

Wilcox discovery finaled in Jasper County, Texas

Potential test is reported at a remote Wilcox oil discovery in Jasper County, Texas Gulf Coast. Atlantic Refining Co. 1 M. Flores Fee "B" flowed 216 bbl. of 42.4°-gravity oil per day from perforations at 9,650-57 ft. Flow was on 16/64-in. choke.

Location is 6 miles northeast of

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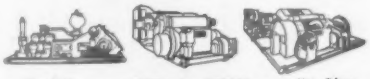

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Buna in the M. Flores Survey, A-13. Nearest production is 3½ miles southwest in Bessmay Wilcox field. New field name of La Verte 9,650-ft. Wilcox is suggested.

Jefferson County. James B. Fuller & Associates opened a new pay in Rosedale field at 1 Dishman Cruse unit. The well had an absolute open flow of 38 M.M.c.f.d. plus 62.2°-gravity condensate flowing for a gas-liquid ratio of 30,100:1. Pay is Frio at 7,046-61 ft. This well was drilled as the confirmation well for 1 Hull-Trotman field discovery. That Nodosaria well flowed 19,700 M.c.f.d. from perforations at 7,417-25 ft. Location is 5 miles northwest of Beaumont in the Thomas Spear Survey, A-50.

South Texas. WM&W Drilling Co. completed 1 L. L. Radford in Ricardo field, Kleberg County, flowing 11,600 M.c.f.d. from two new sands. Tubing side of the dual completion perforated the lower sand at 2,201-94 ft. It flowed 2 M.M.c.f.d. through ¼-in. choke. Upper completion at 2,013-16 ft. got 9,600 M.c.f.d. on ¼-in. choke. This is the shallowest production in the field yet. Location is on the northwest side, 9 miles southeast of Kingsville.

Delaware discovery finaled in Reeves County, W. Texas

A flowing Delaware Permian oil discovery was completed in northern Reeves County, West Texas. Discovery is American Trading and Production Co. 1 J. D. Bodkins et al.

The well flowed 320 bbl. of 38°-gravity oil per day plus 43 bbl. of water. Flow was on 14/64-in. choke from perforations at 5,036-60 ft. Location is in Section 2, Block C-4, PSL Survey, 3¼ miles southwest of North Waha-Delaware field. It lies 25 miles southeast of Pecos.

Flowing discovery tests oil in Texas Panhandle

A Cherokee Pennsylvanian oil discovery is being prepared for completion at D. E. Pinion 1 G. H. Mahler, 2½ miles south of Parsell field, Roberts County, 12 miles west of Canadian in the Texas Panhandle.

The well made 26 bbl. of oil

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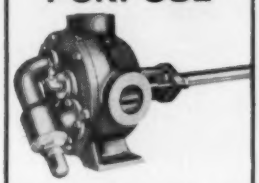
GENERAL PURPOSE



Pumps suitable for handling liquids ranging from gasoline to tar. Twenty-two sizes from ½ to 1050 G.P.M. Built for pressures to 50 P.S.I. handling non-lubricating liquids, 100 P.S.I. on lubricating liquids. Complete range of metals. Packing or mechanical seals. Built to accept all types of mounting arrangements, drives and power units. All pumps self-priming with positive discharge.

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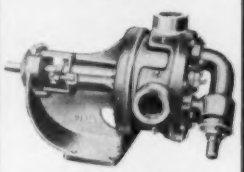

Built for handling either thin, gaseous liquids or extremely viscous materials, even to semi-solids. Constructed for pressures to 100 P.S.I. handling non-lubricating liquids and to 200 P.S.I. handling lubricating liquids. Capacities from 10 to 1050 G.P.M. Packed type in complete line. Mechanical seals through 300 G.P.M. sizes. Mounting, drive arrangements and power units available to suit.

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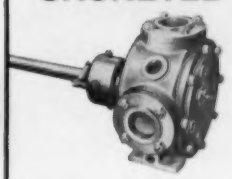

Complete jacketed pump line available in 90, 200, 300 and 450 G.P.M. sizes. Partial jacketing in sizes from 10 to 750 G.P.M. in General Purpose and Heavy-Duty construction. Jackets suitable for steam pressure of 125 lbs. Permits liquids to be heated while passing through pump, keeping the liquid in a flowing state. Packed stuffing boxes. All types of drive and mounting arrangements.

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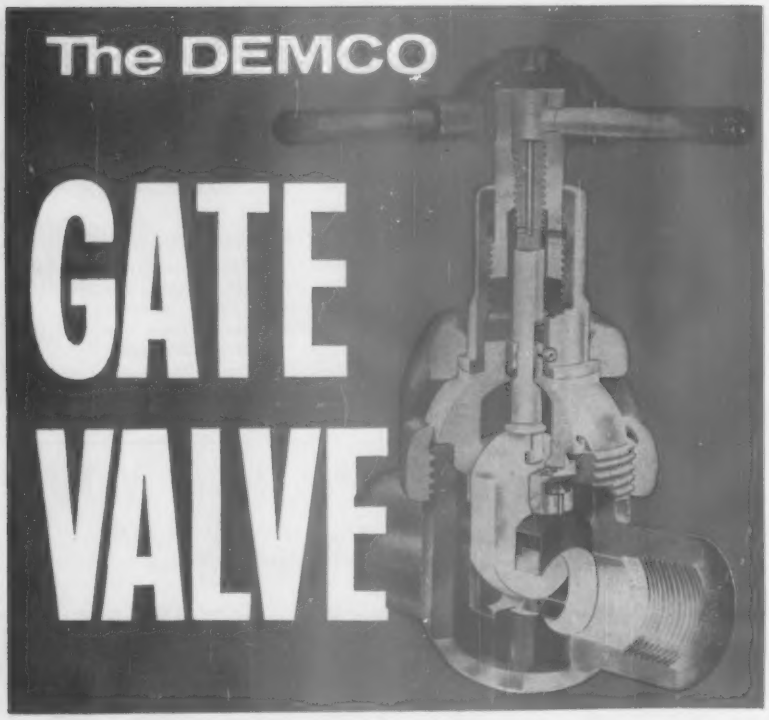

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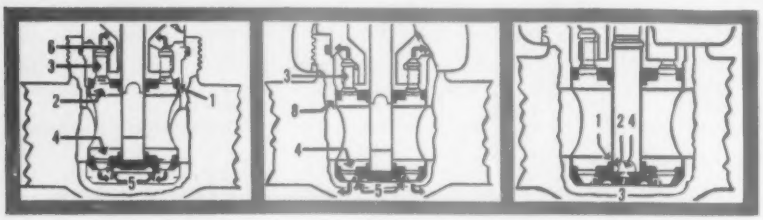
Positive sealing under the highest line pressures—*with minimum torque*—makes the Demco GATE VALVE your best buy for every mud line application . . . for water flooding, hydra-frac, acidizing and cementing service . . . and for many production applications.

Demco's secret lies in its unique one-unit seal assembly, with its patented spread-ring construction. Here's how it works . . .



A. Resilient seat assembly (1) is reinforced with steel wear rings (2), having integral projecting pins at top (3) and bottom (4). In normal contracted position, the seat assembly is easily inserted in, removed from the body. Until the seat assembly is bottomed, the steel spread ring (5) does not act upon the lower projecting pins, nor do the bonnet legs (6) act upon the upper pins.

B. With the bonnet down and the seat assembly bottomed, the spread ring (5) has forced the lower projecting pins (4) outward. Similarly, the upper pins (3) have been wedged outward by the descending bonnet legs, providing a tight seal between body wall (8) and seat, preventing entrance of abrasives between seat and body wall.

C. As gate is closed, leading edge of gate slides past wear ring (1), contacts rubber ring (2) for positive rubber-to-metal seal. Seal occurs before gate touches rubber cushion (3), eliminating need for "bumping." Relief in bottom of gate (4) allows straddling of solid particles that might interfere with proper closure.

Available at supply stores everywhere in 1,000, 1,500, 2,000, 3,000 and 5,000 psi working pressures . . . in two-, three- and four-inch sizes.

DRILLING EQUIPMENT MANUFACTURING CO.

Oklahoma City, Oklahoma

DRILLING EQUIPMENT MFG. CO. DEMCO OKLAHOMA CITY, OKLA. U.S.A.

hourly on 8/64-in. choke from perforations at 9,579-91 ft. It made 40 bbl. of oil per hour on ½-in. choke. Pay is the Cherokee "B" at 9,574-91 ft. Location is in Section 27, Block 44, E. E. Polly Survey. Tops include Brown dolomite 3,615 ft., Heebner 6,322 ft., Morrow shale 7,460 ft., Kansas City lime 7,510 ft., Cherokee "A" 9,473-9,500 ft., Cherokee sand 9,570 ft., Cherokee "B" zone 9,574-81 ft., 13-Finger lime 9,800 ft., middle Morrow sand 10,745 ft.. and Mississippian 11,916 ft.

Deep Wilcox wildcat slated by Halbouty

Michel T. Halbouty, Houston independent oil operator, has staked location for an important 11,500-ft. wildcat well to test the Wilcox formation in Zapata County, 3 miles northeast of Escobas, Tex.

The nearest present production to the Halbouty wildcat is Northeast Thompsonville field, 6 miles to the northeast. Halbouty's location is ½ mile south of Union Producing Co.'s 18 Jennings which is currently being tested.

The well is Michel T. Halbouty's 1-A Luro Garza. Located on a 620-acre tract in Felix Trevino Survey 162, Abstract 540, it is 1,100 ft. west of the most westerly east line and 467 ft. southeast of the property line which is also the northwest lease and survey line.

New pay opened at Pebble Island field, Texas coast

A dual completion is reported at Oil Reserves Corp. 2-K Kirby-Slaughter, discovery of Pebble Island field, Tyler County, Texas Gulf Coast.

The well was originally completed 3 years ago as a single in 8,900-ft. Wilcox sand. A workover job found production in the 9,380-ft. Wilcox. The old flow was 120 bbl. of oil per day on 12/64-in. choke from perforations at 9,378-86 ft. The new flow at 8,894-8,908 ft. was 126 bbl. per day on 9/64-in. choke. Location is 3 miles southeast of Fred in the W. F. Slaughter Survey, A-31. This is the only well in the field.

Workover discovery. Clegg &

group frac treatment of five flood producers gives 7-day payout

A waterflood operator boosted production 153 bopd by fracturing five wells. The cost of all five treatments was paid out with less than seven days production.

This story illustrates how Dowell engineers work with operators to help them boost profits and hold down operating costs.

Profits were boosted in this instance by using the Frac Guide* to design the treatments.

By carefully scheduling jobs, the operator was able to hold treatment costs down and take advantage of group treatment rates.

Pay was the El Dorado Shallow Sand in Butler County, Kansas. Depth ranged from 550 to 760 feet. Waterfrac was employed. 2600 gallons gelled water, 5000 pounds 20-40 mesh sand and 2000 pounds 10-20 mesh sand were used for each well. Average injection rate was 12.5 bpm.

Total oil production from the five wells before treatment was 21 bpd. Stabilized production of oil after treatment was 174 bpd . . . an 8-fold increase. Net sale price for oil was $3.00 per barrel.

Talk over your production problems with your Dowell man. Get his help in designing treatments to cut operating costs, boost production or both.

Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Venezuela, Argentina, Germany, France and the Sahara area. Dowell, Tulsa 1, Oklahoma.

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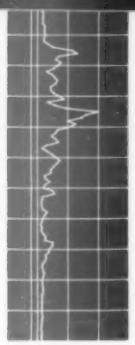


Two men...the inspiration for six thousand

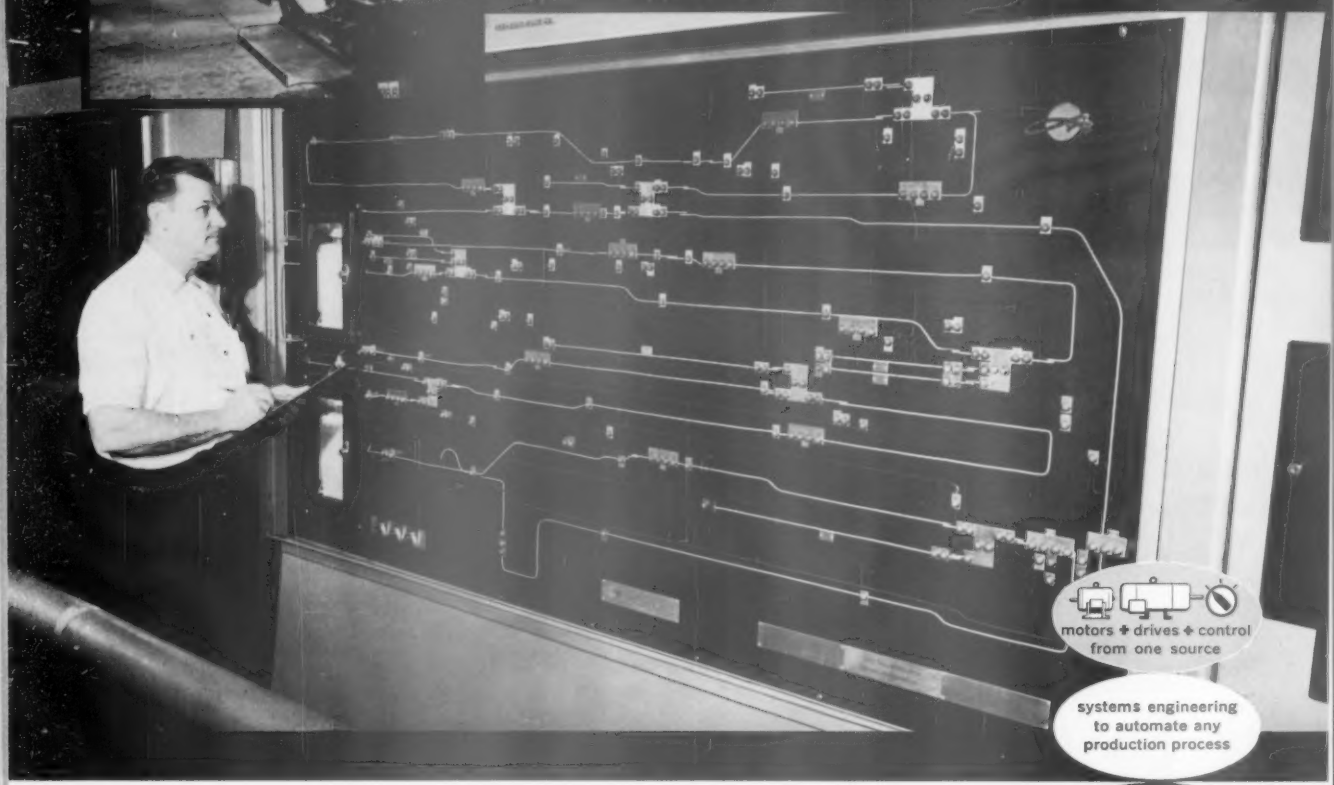
OIL INDUSTRY PROGRESS HAS BEEN MARKED BY MEN WITH THE COURAGE TO RISK FAILURE . . . AND THE KNOWLEDGE, IMAGINATION, AND STAMINA TO ATTAIN SUCCESS. ■ SCHLUMBERGER PROGRESS HAS BEEN SIMILARLY ACHIEVED. ■ CONRAD AND MARCEL SCHLUMBERGER TOOK THE IDEA OF SUBSURFACE ELECTRICAL MEASUREMENTS AND, WITH KNOWLEDGE, IMAGINATION, DARING, AND PERSEVERANCE, DEVELOPED ONE OF THE MOST VALUABLE CONTRIBUTIONS TO THE EXPLORATION AND PRODUCTION OF OIL — ELECTRICAL LOGGING. ■ THEY HAD ANOTHER TALENT . . THE ABILITY TO TEACH, TRAIN, AND INSPIRE THEIR CO-WORKERS WITH THE SAME ZEST FOR EXCELLENCE . . . THE TIRELESS SPIRIT OF SERVICE. ■ MORE THAN 6000 SCHLUMBERGER EMPLOYEES THROUGHOUT THE WORLD ARE GUIDED BY A HERITAGE OF LEADERSHIP AS THEY PERFORM THEIR JOBS OF CONTINUALLY IMPROVING AND EXPANDING THEIR SERVICES TO THE OIL INDUSTRY.

LEADERSHIP FROM THE START **SCHLUMBERGER**

FROM INITIAL BODY ASSEMBLY—Louis Allis controllers coordinate the intricate assembly of side-gate framing fixtures and underbody just prior to welding by synchronizing the arrival of three components from three different locations at precisely the same time . . .

TO PRE-FINAL ASSEMBLY AREA—where a bank of Louis Allis controllers regulate the drives powering the mating line where unitized body, stub-frame / engine assembly and running gear are assembled into units like the Plymouth convertible shown coming off the assembly line . . .

AND 3-DIMENSIONAL AREA CONTROL CENTER — which monitors conveyor operations. Any type of production interruption is quickly revealed and identified by signal light indication. Recorders provide a permanent daily record of each conveyor's operation.



LOUIS ALLIS engineered systems automate Chrysler assembly lines

An automobile assembly line is a materials handling complex of movement and synchronization. Feeder lines joining the main-line must deliver components on time — and in perfect synchronism. Still, the system must be flexible enough to accommodate speed changes when desired.

The Plymouth assembly plants in Detroit and St. Louis are models of this type of automation . . . and electrical components for the materials handling systems were custom-engineered by Louis Allis. L. A. systems engineers worked with Plymouth engineers to map the flow sequence. Louis Allis provided the adjustable speed drives and precision controls to operate the systems and supervised the installation. The result: integrated, automated systems that eliminate time loss, manpower waste, and excess materials handling costs.

Synchronized conveyors operate at pre-set speeds by following built-in master job-rate controllers. The system provides for automatic, position-perfect transfer of body components from one conveyor to another. A three-dimensional area control center monitors and records all conveyor operations.

If your plans call for automation, contact Louis Allis for systems engineering assistance — and single-source responsibility of drive and control design, manufacturing, and service. Call the Louis Allis District Office nearest you, or write to The Louis Allis Co., 449 East Stewart Street, Milwaukee 1, Wisconsin. Ask for Bulletin 2900.

LOUIS ALLIS

ASD-239

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Hunt 2 Nona Mills, workover well in Gilbert Woods field, Jefferson County, Texas Gulf Coast, flowed 216 bbl. per day on 20/64-in. choke from perforations in the Hackberry at 9,908-14 ft. The well was first a gasser in January 1956 from upper Nodosaria perforations at 10,355-95 ft. It flowed 200 M.M.c.f.d. at that time. Location is 6½ miles northeast of Fannett in the J. C. Grant Survey, A-127. Nearest production is 1¾ miles northeast at Gilbert Ranch field.

New Blessing pay. Another new oil pay was found in prolific multi-pay Blessing field in Matagorda County, Texas.

Texaco Inc. 31 Blessing St. Germain flowed 204 bbl. of 43.3°-gravity oil daily through 10/64-in. choke from F-15 Frio perforations at 8,208-11 ft. Location is inside the city of Blessing in the J. E. Pierce Survey 2, A-540.

California operators plan Mississippi tests

Five California operators are grading location for a lower Tuscaloosa sand test in Perry County, Mississippi.

The company holds 4,400 acres in Perry County and 3,800 acres in Lamar County, both in Southeast Mississippi. A wildcat also is planned on the Lamar County acreage, but will be spudded this month.

State Exploration Co., operator for the group, says the first well, 1 Masonite in 18-3n-9w, will go to 9,300 ft. The test may be deepened to 11,800 ft. in the Dantzler. Similar depths are planned for the second well.

Associated with State in the Venture are McCulloch Oil Corp. of California, Tuscalo Oil & Gas Co., V. P. Baker, and A. J. West.

Oil discovery finaled in Texas County, Oklahoma

The Oklahoma Panhandle has a new oil discovery at Ambassador Oil Corp. 1 Wien in C SE NW 10-3n-18eCM, northwest of Northeast Hardesty field in Texas County.

This new well flowed 260 bbl. of oil per day through ¼-in. choke from upper Morrow Pennsylvanian sand perforations at 6,342-46 ft.

At South Hovey field, Republic Natural Gas Co. tested a second zone at 24-M Cities Service in C NW SE 6-4n-13eCM. A flow of 39,429 M.c.f.d. was reported in the Morrow-A sand at 6,012-18 ft. on 20/64-in. choke. Later it flowed 31 M.M.c.f.d. From Cherokee Pennsylvanian at 5,453-61 ft. swab test got 7 bbl. of oil in 5 hours and 3 M.M.c.f.d. after treatment.

Ellis County. Pan American Petroleum Corp. added the third well to Southwest May field in northern Ellis County at 1 Barrett, C SE NW 10-24n-25w.

The well flowed 1,980 M.c.f.d. from perforations in the Morrow sand at 7,707-89 ft.

Marietta test finds McLish oil sands

AN IMPORTANT WELL in extreme southern Oklahoma is testing oil in the basal McLish Ordovician sands. It is Pan American Petroleum Corp. 1 Callahan-Lee in C NW 34-6s-9e, northwest side of East Durant field in Bryan County.

The well flowed 320 bbl. of oil in 17 hours on initial tests before being shut in for tankage. Flow was from perforations at 8,043-44, 8,060-61, 8,084-85, and 8,098-99 ft. Pan Am is drilling another well at 1 Wolford to the northwest in C SE 28-6s-9e.

Cleveland County. A Viola Ordovician oil discovery in South Central Oklahoma was confirmed at North Red Spring. An-Son Petroleum Corp. completed 1 Lambdin-A, SW NE NE 13-6n-1e. Flow was 147 bbl. of 38.2°-gravity oil in 13 hours from Viola perforations at 5,628-32 ft. The discovery well here was a workover at 1 Lambdin in NW SE NE 13. It pumped 55 bbl. of oil and 10 bbl. water per day from Viola perforations at 5,558-76 ft.

Discovery wells

WESTERN CANADA

Alberta:

Sun et al. 14-26 West Ponoka, LSD 14, 26-44-27w4. Basal Quartz gas discovery. TD 7,470 ft.

Manitoba:

Kissinger et al. 14-20 Pierson Province, LSD 14, 20-2-28w1. Mission Canyon oil discovery. TD 3,395 ft.

B.A.-CPR 13-19 Kerbes Fenn, LSD 13, 19-36-20w4. Devonian oil discovery. TD 5,700 ft.

B.A.-CPR-Shaw BV 14-33 Fenn, LSD 14, 33-35 20w4. Devonian oil discovery. TD 5,800 ft.

CANPET-Tidal 11-35 Scotfield, LSD 11, 35-29-11w4. Bow Island gas discovery. TD 3,647 ft.

Mid-Western Gas 7-35 Manawan, LSD 7, 35-56-26w4. Basal Quartz gas discovery. TD 3,895 ft.

OKLAHOMA

Blaine County:

Pan American Petroleum Corp. 1 Fleshman Unit, SE NE SW 32-20n-10w. IPCOF 1,150 M.c.f.d., Chester open hole 7,303 25 ft. TD 7,399 ft. PBTD 7,325 ft. New gas discovery 2½ miles northeast of Okeene.

Hughes County:

Harry H. Diamond et al. 1 Meyers, C NE SW 29-8n-12e. IPCOF 2 M.M.c.f.d., no water, 2-in. casing choke from Booch 2,174-93 and Gilcrease 2,942-46 ft. SICP 650/24 hours; IPF 2,800 M.c.f.d., with slight spray water, 2-in. choke from Gilcrease, SITP 1,110/24 hours. TD 3,874 ft. PB 2,950 ft. Dual gas discovery, shut in.

LeFlore County:

Midwest Oil Corp. 1 Goldsborough, 16 miles west of Poteau in SE SW NE 31-7n-23e. IPF 2,710 M.c.f.d., open 2½-in. tubing, FTP 1,825 psi., SITP 2,986 psi., Red Oak 6,986-7,084 ft. TD 13,384 ft. New gas discovery, shut in.

EAST TEXAS

Harrison County:

Hollandsworth and Travis 2 Barker-Hope, J. W. Barrett Sur., A-86, 4½ miles northeast of Scottsville. IPAOF 3,700 M.c.f.d., GOR 33,900:1, 61.6°, Pet-Page sand 6,388-98 ft. ft. TD 6,721 ft. Gas-condensate discovery.

1 Blackman, E. D. Spain Sur., 3½ miles northeast of Scottsville. IPCOF 6,300 M.c.f.d., GOR 54,000:1, 65.6°, Pettus 6,206-12 ft. TD 6,735 ft. Gas-condensate discovery.

WYOMING

Campbell County:

Stuarco et al. 1 Miller, C SW SE 21-50n-69w. IPP 233 BOPD, Muddy 6,501½-7½ ft. TD 6,820 ft. Muddy discovery, new field.

Fremont County, Dinty Moore Reservoir:

Shell Oil Co. et al. 1 Government, C NE SW 3-37n-92w. IPF 2,591 M.c.f.d., 40 bbl. cond., 28 BW per 1 M.M.c.f., open flow potential, shut in gas well, lower Fort Union 9,138-44 ft. TD 10,000 ft. PB 9,550 ft. Fort Union gas discovery, new field.

Weston County:

Stuarco Oil Co. 1 George, C SW SW 27-45n-66w. IPP 278 BOPD, Dakota 6,540-43 ft. TD 6,614 ft. Dakota discovery, new field.

KANSAS

Graham County:

Imperial Oil of Kansas Inc. 1 Richmeier, C NW SE 30-9s-25w. IPP 142 BOPD, trace water, Lansing 4,038-62 ft. TD 4,400 ft. New oil discovery.

Grant County:

Columbian Fuel Corp. 21B Da Vatz, C SE NW 13-28s-36w. IPF 2 M.M.c.f.d., Council Grove Permian 2,846-2,908 ft. IPF 144 BOPD, Morrow Penn. 5,231-32 ft. TD 5,850 ft. Dual completion, new oil and gas discovery.

Amerada's Faust to Head SEG

• New president is a former editor of Geophysics, winner of 1951 best-paper award, and almost a charter member.

DR. LAWRENCE FAUST, Tulsa, geophysical supervisor for Amerada Petroleum Corp., has been elected president of the Society of Exploration Geophysicists.

He will take office November 9 in Denver at the society's thirty-first international meeting. This is Dr. Faust's thirty-first year in SEG—his membership card carries the number 81. He will succeed Dr. J. P. Woods, Dallas, as president.

Faust served as editor of Geophysics, the society's international magazine, from 1957 to 1959.

Wide acclaim came to him in 1951 when he received the "Best Paper Award" for the year. The paper was a study of relationships of seismic velocities to depths and to geologic age. This premise, for advanced seismic appraisals, is recognized world wide.

The March 1961 Journal of the European Association of Exploration Geophysicists carries a French translation of an exploration article by three French authors, with this editor's note:

"It was felt that Faust's first law was the best guide in classifying data concerning velocities." The "law" first was expressed in the 1951 award-winning document.

This scientist-business man was born in Clearville, Pa., and went through grammar schools in the hard coal regions near St. Clair, Pa. He worked summers loading coal and doing odd jobs above-ground at the mine tipples. He studied physics at Mercersburg Academy and completed his degree work at Franklin & Marshall College, Lancaster, Pa.

He was with Sun Oil Co. in Dallas, doing magnetic survey work, in 1926 and '27. He did graduate work on a fellowship at the University of Pennsylvania from 1928 to 1930. That year, he joined Geophysical Research Corp. in Tulsa as party chief and later was made supervisor. He transferred to Amerada, the parent company, and has been with it since.

As geophysical supervisor, Dr. Faust now directs geophysical exploration work in Somalia for the Sinclair Somal group; directs geophysical exploration in Tunisia for Conorada; and consults with Oasis Oil Co. of Libya on seismic interpretations.

Faust does not do his geophysical

▶▶▶ Personals

J. C. McCarthy, Houston, has been named assistant division production superintendent for Pan American Petroleum Corp.'s Rocky Mountain division. He will headquarter in Casper, Wyo. McCarthy succeeds **J. W. Phenicie,** who has been transferred to Houston.

L. C. Anglin, Jr., C. B. Berry, Jr., and **William D. Taylor** have joined Ethyl Corp. in Baton Rouge, La., as chemical engineers in process development. New chemical engineers in the Baton Rouge process-design department are **Calvin S. Moore** and **William L. Schuette.**

Earl Austin has been named Denver division manager for Murphy Corp. He succeeds **Robert L. Grady,** who has been transferred to New Orleans and assigned to Ocean Drilling & Exploration Co., a Murphy subsidiary.

Phil S. Justice, who recently retired from Sun Oil Co., has opened offices in Denver as oil and gas consultant. Justice was manager of Sun's Rocky Mountain division at one time and more recently had been special assistant to the senior vice president.

Tom Crotser, formerly chief geologist for Vaughey & Vaughey in Denver, has opened consulting offices in Littleton, Colo.

Dr. Manus R. Foster has been promoted to senior research associate at Socony Mobil Oil Co.'s field research laboratory in Dallas.

Lawrence B. Kelly, marketing manager of American Oil Co.'s Milwaukee region, has been promoted to Twin Cities regional manager in Minneapolis. **R. E. Bowen,** New Orleans region marketing manager, will succeed Kelly in Milwaukee. **Eugene J. Murray,** Milwaukee district manager, has been transferred to the new Los Angeles region.

supervising entirely from behind a desk. He recently made trips to Tunisia and Somalia to check on-the-spot progress of seismic crews.

DOBRIN

WARD

PINSON

RICE

Other officers elected by SEG for the 1961-62 term are:

... **Dr. Milton B. Dobrin,** Pasadena, Calif., chief geophysicist for United Geophysical Corp., first vice president.

... **Dr. Stanley H. Ward,** Berkeley, Calif., consulting geophysicist and associate professor of mineral exploration at the University of California, vice president.

... **R. Maxey Pinson,** Midland, Tex., division geophysicist for Union Oil Co., of California, secretary-treasurer.

... **R. B. Rice,** Littleton, Colo., supervisor of Ohio Oil Co.'s physics department, editor.

Kenneth W. Kramer has been promoted to project chemist in the technical-service division of American Oil Co.'s Whiting, Ind., refinery. **Charles J. Billerbeck** has been promoted to project chemical engineer in the technical-service division, Whiting.

H. M. Bell, glycol plant production supervisor in Dow Chemical Co.'s Louisiana division, Plaquemine, has been promoted to glycol plant superintendent. He succeeds **H. D. Sullivan. R. H. Fisackerly** has been named to succeed **J. R. Mier** as superintendent of the Plaquemine vinyl chloride plant. Fisackerly had been production supervisor, vinyl chloride.

Dr. R. W. Winkler has been named operations manager in Esso International's supply department.

Tom Hurguth has been named manager of diamond coring and sales for Exploration Service Co., Houston. **Warren Remington** has been named manager of the core-analysis department.

F. E. Foss, division production geologist in Shell Oil Co.'s Denver area, has been transferred to Houston as production geologist. **R. E. Burns** and **D. M. Vander Stoep,** geophysicists in the Denver area, also have been transferred to Houston. **F. B. Conger III,** geologist in Houston, has been transferred to the Pacific Coast area.

John M. Clayton, Jr., Dallas independent, has been elected 1961-62 president of Dallas Geological Society. He succeeds **Edgar Kraus,** Atlantic Refining Co. Other new officers are **Joseph W. Lea,** Sun Oil Co., first vice president; **George W. Wilson,** Concho Petroleum Co., second vice president; **R. L. Foree, Jr.,** Foree Drilling Co., secretary; and **Robert G. Cox,** Standard Oil Co. of Texas, treasurer.

Vern E. Stepp has been named supervisor of the proration and unitization section in Atlantic Refining Co.'s new engineering division in Dallas. Also in this division, **Russ C. Hartman** will be supervisor of the gas-engineering section. **Howard A. Koch, Jr.,** will be supervisor of the reservoir-engineering group, and **J. H. Sullivan** will be supervisor of the chemical - engineering section. **J. E. Hellinghausen** will be supervisor of the drilling group and **Donald B. Helm** will be supervisor of the production - engineering group. In Atlantic's exploration division, Dallas, these section supervisors have been named: **Charles H. Hightower,** geophysical - staff section; **John P. Woods,** geophysical sciences; **Milton S. Hathaway,** geophysical party; **Julius Babisak,** geological staff; and **Robert S. Agatson,** geological sciences. **Robert N. Kolm** will be on special assignment in both domestic and foreign exploration. In Atlantic's southwest division of engineering and construction, **F. C. Williams** has been named supervisor of the construction section.

▶▶▶ Personals

W. D. Bartholomew, associate design engineer with American Oil Co., has been promoted to design engineer at the Texas City refinery. He has been with American since 1953.

Roy O. Smith, formerly manager of States Exploration Co.'s Gulf Coast area, has opened geophysical consulting offices in Houston. Smith was with Robert H. Ray Co. and Southern Geophysical Co. before joining States Exploration.

James R. McMurry, division geologist in Midland, Tex., for Texaco, has been named assistant manager of Texaco Exploration Co., a subsidiary. He will headquarter in Calgary. **R. E. Hunt,** assistant division geologist in Midland, will move up to succeed McMurry.

Claude D. Gaines, petroleum engineer for Sinclair Oil & Gas Co. in Denver, has been promoted to staff engineer and transferred to Tulsa. Gaines has been with Sinclair since 1949.

Dwight H. Seely, Jr., who has been on temporary assignment in Sohio Petroleum Co.'s Cleveland office as active assistant for exploration, has returned to Houston as Gulf Coast area exploration manager. **C. E. Storm, Jr.,** area land man for the Gulf Coast, has been promoted to assistant Gulf Coast exploration manager. Storm had been acting exploration manager during Seely's absence.

R. D. Anding, assistant manager of the crude and product-coordination department at Humble's Baton Rouge, La., refinery, has been promoted to manager of the department. He succeeds **Randall Meyer,** who has been transferred to Humble's headquarters supply and transportation department in Houston. **R. W. McDonald** will succeed Anding. **C. B. Moore,** assistant head of the technical division at Baton Rouge, has been transferred to the manufacturing department in Houston. **R. E. Wood** will take over Moore's responsibilities in addition to his assignment as assistant head of the technical division.

Personals

W. F. Davis has been appointed vice president in charge of operations for Humble Pipe Line Co., Houston. **S. Brown** has been named vice president, financial, and **C. E. Shaver** has been named general counsel. Davis, Brown, and Shaver will serve as directors of the company along with **P. H. Hunter** and **W. S. Spangler.** Appointment of Hunter as president and Spangler as executive vice president of the new company was made earlier. Merger of Humble Pipe Line and Interstate Oil Pipe Line Co. became effective July 31 (OGJ, July 10, p. 77). Other operating appointments in the new company include: **W. A. Castille,** general manager of operations; **P. D. Phillips, Jr.,** manager of planning and development; **S. C. Phelps,** assistant manager of planning and development; **G. G. Hughes, Jr.,** coordinator of engineering; **F. O. Stivers,** coordinator of planning and evaluation; **J. E. Barbee,** coordinator of communications; **H. F. Taylor,** coordinator of oil movements; and **C. B. Palmer, Jr.,** assistant coordinator of oil movements.

DAVIS

BROWN

SHAVER

C. L. Frazier, construction foreman for Anadarko Production Co., has been named operations superintendent in Augusta, Kans. Anadarko, a subsidiary of Panhandle Eastern Pipe Line Co., is building a gas line from Kansas' Spivey-Grabs-Basil field to Skelly's El Dorado, Kans., refinery.

A. W. Coulter, Jr., has been named laboratory group leader for Dowell division of Dow Chemical Co. in Tulsa.

Floyd E. Suder, Jr., has joined Forest Oil Corp. in Houston as reservoir engineer. Suder formerly was reservoir engineer with Ada Oil Co. in Houston.

Graham P. J. Shepherd has been elected managing director of British Sun Oil Co., Ltd., a subsidiary of Sun Oil Co. He succeeds **Cyril Blake-Smith,** who has retired after 25 years with British Sun. Shepherd was with Imperial Oil before joining British Sun last year in London as assistant to the managing director.

F. J. O'Reilly, superintendent of Skelly Oil Co.'s El Dorado, Kans., refinery, has been named head of the manufacturing department's economics and planning section, technical service division. He will headquarter in Tulsa. **W. L. Pursell,** chief engineer of the El Dorado refinery, has been appointed superintendent.

E. A. Daigle, research and development engineer in Dow Chemical Co.'s Texas division, Freeport, has been promoted to senior production engineer. **W. F. McIlhenny,** project leader in chemical research, has been promoted to research specialist. **W. B. Oelfke,** chemist, has been named assistant production superintendent. **B. W. Wilson,** research chemist, has been named project leader in the organic product-development laboratory.

James D. Cooper, operations manager for Three States Natural Gas Co., has been named manager of operations for Delhi-Taylor Oil Corp. in Dallas. In other changes resulting from consolidation of producing properties of Three States and Delhi-Taylor, **William S. McCready,** assistant manager of production technical-services, has been named Kilgore, Tex., district superintendent and **William Barry,** Dallas staff petroleum engineer, has been named district engineer in Kilgore. Also, **R. L. Denton,** district engineer, has been transferred to Alice, Tex., from Victoria, Tex. **James Porterfield** has been transferred from Lafayette, La., to Alice as district production foreman, and **Edgar W. Guynn,** district engineer, has been moved from Alice to McAllen, Tex.

George L. Robinson, Buckeye Pipe Line Co.'s vice president, operations, will now direct all pipeline operations of the company. He formerly was responsible for only the eastern products division operations. Robinson will move from Macungie, Pa., to the New York offices of the company.

Dr. Loren L. Neff has been promoted to senior section leader in the production-research division of Union Oil Co.'s Brea, Calif., research center.

S. I. Betzer, district superintendent of Phillips Petroleum Co.'s North Burbank unit, Shidler, Okla., has been named superintendent of the Panhandle district in Borger, Tex. He succeeds **R. W. O'Neill,** who will take over the district superintendent post in Shidler. **J. L. Bowden,** development foreman in the Guymon, Okla., district, has been named district foreman of the North Burbank unit. **J. W. Carter,** who formerly held this post in the North Burbank unit, will succeed Bowden in the Guymon district.

Death

Sir Hubert Bryan Heath Eves, 78, a leader of the British oil industry in the first half of the century, died July 27 in London. Originally with Burmah Oil Co., he transferred to Anglo-Persian Oil Co. (now British Petroleum). He served on the board of the company from 1924 to 1953 and as deputy chairman from 1941 to 1953.

John Borden, 78, former president of Old Dutch Refining Co., Muskegon, Mich., died July 29.

J. Burris Mitchel, 82, senior partner in the Mitchel Co., Los Angeles, died July 29 in a Los Angeles hospital. Mitchel had been active in the oil business for about 50 years, working in California, Texas, Montana, and South Dakota.

Roy L. Robertson, 61, assistant senior purchasing agent for Phillips

C. W. Nofsinger, president of C. W. Nofsinger Co., Kansas City engineering firm, has been elected vice chairman of Western Petrochemical Corp.

D. W. Gresser has been named Pacific Coast area geologist for Shell Oil Co. Gresser recently returned from a special assignment in The Hague. He is a former manager of Shell's Farmington, N. M., exploration division.

Carl Hauck, Ohio Fuel Gas Co., Columbus, Ohio, has been elected chairman of the eastern district of API's Division of Production. **W. B. Maxwell,** United Fuel Gas Co., Charleston, W. Va., has been elected chairman of the district advisory committee and **John Kime,** Preston Oil Co., Columbus, has been named district secretary-treasurer. Newly elected district vice chairmen are: **Quentin Wood,** Quaker State Oil Refining Co., Bradford, Pa.; **Paul Cunningham,** Equitable Gas Co., Pittsburgh; **H. J. Magner,** Delta Drilling Co., Pittsburgh; **H. T. Heuple,** Manufacturers Light & Heat Co., Pittsburgh; **Harry Hoover,** East Ohio Gas Co., Cleveland; **D. C. Hubbard,** Ohio Fuel Gas Co., Columbus; **E. Paul Ward,** Ohio Oil Co., Findlay, Ohio; **Fred Moran,** Owensboro, Ky., independent; **Otis Horne,** Inland Gas Corp., Ashland, Ky.; **W. C. Best,** Gulf Oil Corp., Evansville, Ind.; **Howard Brockman,** Calvert Exploration Co., Olney, Ill.; **Melvin Sauter,** Sun Oil Co., Mount Pleasant, Mich.; **Jack L. Trittipo,** United Carbon Co., Charleston; **J. Robert Hornor,** Delaware Gas Co., Clarksburg, W. Va.; and **Bill Hilliard,** Hilliard Drilling Co., Mount Pleasant.

HAUCK

Albert C. Marino, manager of exchange and scheduling in American Oil Co.'s supply and transportation department, has retired after 34 years with the company.

Maynard D. Upper, industrial products manager for Sun Oil Co. in Cleveland, has been named industrial products manager of the Middle Atlantic sales region. He will headquarter in Philadelphia. Upper succeeds **Robert C. Brady,** who has been named sales coordinator for SunOlin Chemical Co. in Philadelphia.

▶▶▶ Personals

Dr. James S. Cross, manager of statistical research for Sun Oil Co., has been named head of Sun's new economics department. Also assigned to the new department are **John H. Rabbitt,** who will be manager of the statistical-research division; **George W. Gershefski,** manager of the corporate economic-planning division; and **Donald I. Miller,** manager of the research methods and techniques division.

CROSS

Ted Peters, chemist in the chemical technical-service division at Humble's Bayway refinery, Linden, N. J., has been promoted to senior chemist.

Harold M. Crump, supervisor of supply and distribution on Gulf Oil Corp.'s southwestern region staff, has been promoted to distribution adviser in domestic marketing headquarters, Houston. **Ian L. Landry** will succeed Crump in the southwestern region post.

Petroleum Co. in Bartlesville, Okla., died July 24 of cancer. Robertson had been with Phillips since 1923.

Donald S. Coye, 57, attorney for Shell Oil Co., died July 22 in a Huntington Park, Calif., hospital. Coye was chairman of the American Bar Association's public lands committee, mineral section, and chairman of the oil and gas committee of the Los Angeles Bar Association. He had been with Shell since 1934.

William F. Johnson, 51, shift foreman for Gulf Refining Co. in Toledo, Ohio, died July 19 at his home in Toledo. He had been with Gulf Refining 31 years.

B. I. Dikmen, 47, owner and president of United Engineers, Inc., Tulsa, died July 27 in a Tulsa hospital after suffering a heart attack at work. Dikmen came to the U. S. from his native Turkey in the 1940's. He was with Manning, Maxwell & Moore before founding United Engineers in Tulsa. The engineering firm has done extensive work with electronic instrumentation and controls in the petroleum industry.

Thomas Earl Parrott, 79, retired chief engineer at Sinclair Pipe Line Co.'s Manuel station near Oklahoma City, died July 27 in a Claremore, Okla., hospital. Parrott was a district superintendent for Sinclair Pipe Line for many years. He retired in 1945.

Robert Lee Imler, 71, retired attorney for Sinclair Oil & Gas Co., died July 30 at his home in Tulsa.

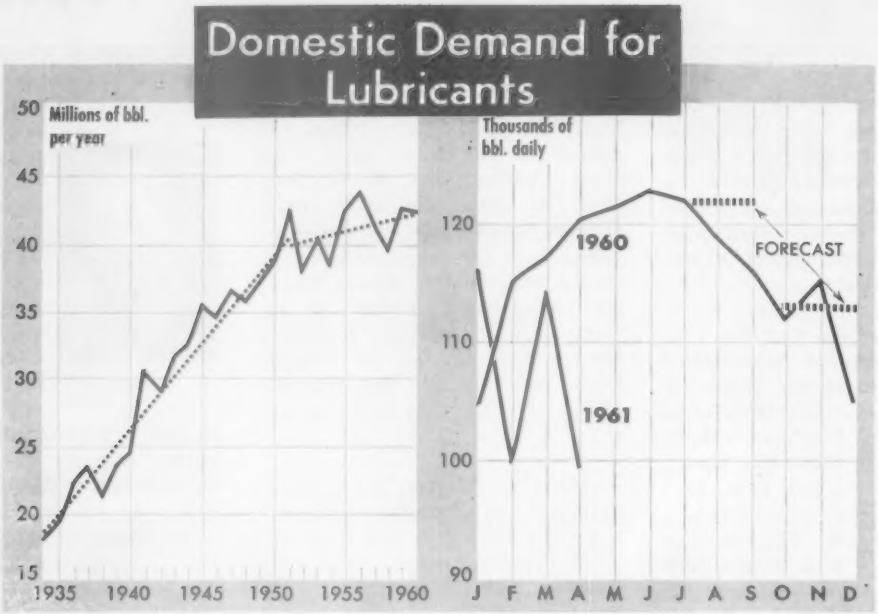
Raymond George Duroy, 54, general superintendent of Superior Oil Co.'s Lake Creek, Tex., division, died July 25 in a Houston hospital after several months' illness. Duroy had been with Superior 35 years.

Russell Charles Hammack, Sr., 66, superintendent and chief engineer at Marshall R. Young Co.'s Albany, Tex., natural-gasoline plant, died July 18 at his home in Albany.

Ambrose W. Hickey, 75, retired field drilling superintendent for Sinclair Oil & Gas Co., died July 23 at his home in Clyde, Tex. Hickey retired in 1945.

Woodley Gail Phillips, 84, pioneer Oklahoma oil producer, died July 26 in a Jamestown, N. Y., hospital after suffering a heart attack at his summer home in Chautauqua, N. Y.

Henry Grady Meador, 71, retired senior vice president in charge of marketing for Gulf Oil Corp., died July 27 at his home in New Orleans after a long illness. Meador joined Gulf in 1910 as superintendent of the company's New Orleans bulk plant. He retired in 1957.



Lube demand will be down again in '61

BY JOHN C. CASPER

GAINS IN DEMAND for petroleum lubricants have slowed to a crawl. The big shift came in the early fifties. There is little chance for even a small gain in 1961 despite an increase in gasoline consumption and the expected improvement in industrial production.

So much for the trends. Here are some of the details. Domestic demand for lube oils in 1934 amounted to 18.5 million barrels or 50,600 bbl. daily. The chart on the left shows irregular but sharp gains until about 1951. The average for that year was 115,900 bbl. daily or a gain of 129% over the total for 1934.

The straight line represents the calculated trend for the period. Demand growth was at the average rate of 4.7% a year, but this rate was not up to the average annual increases for total petroleum products. The all-product average was 6.2% a year.

Note that the war years were above the trend line. Civilian consumption of gasoline was restricted during the war period, and this limitation on driving cut sales of automotive oils for civilian cars. This reduction was more than offset by military purchases and increased demand for industrial lubricants.

The line also shows the influence of recessions on demand for lubricants. Sharp dips show up for the years 1938 and 1949.

The second segment of the first chart gives a picture of lube demand since 1951. The line no longer has a steep upward slope. The average annual gain for the 1951-60 period was 0.6% a year.

On the right chart, demand for the first 4 months of 1961 showed a definite decline from rates reported for 1960. Out of the first 4 months of the year, only January had a gain over last year. Total for the first half of 1951 is estimated to be down 2.5% from first half of 1960.

Forecasts of better demand in the last half are based on expected increases in demand for gasoline and a general rise in industrial production before the end of the year.

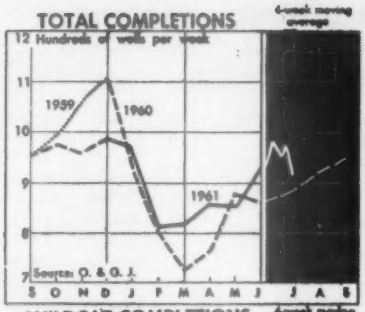
Broken lines on the second chart show these forecasts of lube demand for the third and fourth quarters of this year. They represent increases over corresponding quarters last year, but the gains are not enough to prevent a decrease for the year. Total for the year will be down about 0.9%.

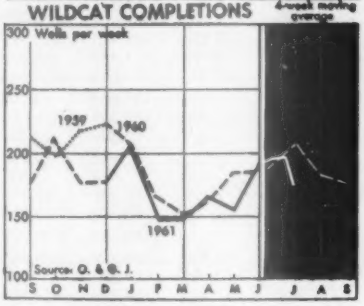
A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,964,150	UP	190	UP	85,357
Crude stocks	256,747,000	DOWN	2,096,000	UP	11,831,000
Completions	873	DOWN	174	DOWN	49
Refinery runs	8,397,000	UP	113,000	UP	107,000
Gasoline stocks	193,510,000	DOWN	2,945,000	UP	315,000
Kerosine stocks	31,864,000	UP	1,144,000	UP	2,067,000
Distillate stocks	129,290,000	UP	4,573,000	UP	349,000
Residual stocks	50,226,000	UP	367,000	UP	6,840,000
Four-product stocks	404,890,000	UP	3,139,000	UP	9,571,000
Total imports	2,191,000	UP	254,600	UP	734,000

Active Rotary Rigs

DRILLING





	7-31-61	7-24-61	8-1-60
Alabama	4	3	4
Alaska	11	11	7
Arkansas	11	10	12
Arizona	0	0	1
California	78	76	78
Land	73	71	76
Offshore	5	5	2
Colorado	29	32	39
Florida	0	0	2
Land	0	0	2
Offshore	0	0	0
Georgia	0	1	0
Illinois	41	43	40
Indiana	10	11	15
Iowa	1	1	0
Kansas	108	109	109
Kentucky	2	2	3
Louisiana	265	262	290
North	37	26	39
S. Inland waters	105	109	110
S. Land	71	74	82
Offshore	52	53	59
Maryland	0	0	1
Michigan	32	24	43
Mississippi	57	64	57
Missouri	3	3	1
Montana	26	25	20
Nebraska	20	21	25
New Mexico	114	106	110
New York	1	1	0
North Dakota	15	14	13
Ohio	8	8	5
Oklahoma	205	221	150
Oregon	0	0	1
Pennsylvania	7	5	10
South Dakota	0	1	0
Texas	697	680	558
S. Inland waters	8	8	4
S. Land	197	193	162
Offshore	2	2	1
North	67	68	48
Panhandle	74	67	46
East	69	68	41
West Central	164	155	158
West	116	119	98
Utah	35	36	27
Washington	1	1	1
West Virginia	13	11	4
Wyoming	53	59	73
Total U. S.	1,847	1,841	1,699
Cum. avg. to date	1,680	1,673	1,735
Western Canada	143	155	180
Eastern Canada	2	2	1
Grand total	1,992	1,998	1,880

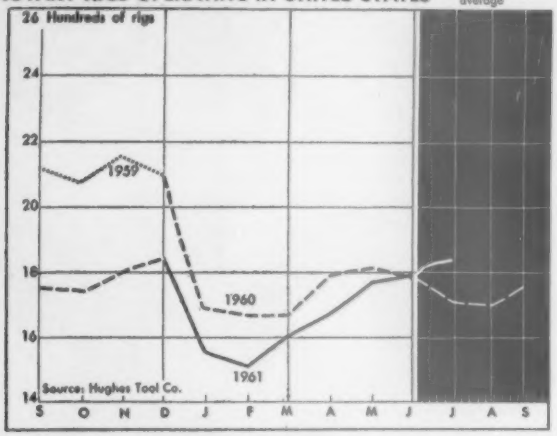
Hughes Tool Co. report.

WEEKLY WELL COMPLETIONS... WEEK ENDED JULY 29, 1961

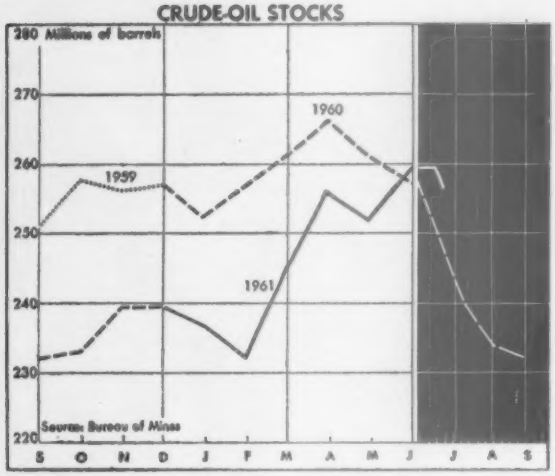
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Alabama	0	0	0	0	0	0	0	31	28	0	0	0	0	0	7	1
Alaska	3	3	0	0	0	0	32,315	24	.....	0	0	0	0	0	3	.....
Appalachian	32	13	0	8	1	10	50,140	1,233	1,035	0	0	0	0	0	47	38
Arizona	0	0	0	0	0	0	0	13	20	0	0	0	0	0	8	16
Arkansas	14	4	0	1	8	1	52,054	286	356	2	0	0	0	2	56	97
California	42	34	0	2	5	1	191,374	939	953	4	0	0	1	3	153	170
Colorado	7	1	0	2	4	0	31,202	354	356	2	0	0	0	2	170	175
Illinois	41	21	0	3	17	0	90,392	1,082	1,189	5	1	0	0	4	228	252
Indiana	18	7	0	0	10	1	27,601	380	543	1	1	0	0	0	108	209
Kansas	71	18	0	7	42	4	258,929	3,014	1,848	24	2	0	1	21	561	605
Kentucky	124	4	0	3	16	101	130,712	1,069	946	3	0	0	0	3	85	111
Louisiana	64	29	6	4	25	0	487,722	2,131	1,994	13	1	0	0	12	335	317
North	32	17	2	4	9	0	116,722	840	722	2	0	0	0	2	141	149
South	26	9	4	0	13	0	300,369	984	979	9	1	0	0	8	161	147
Offshore	6	3	0	0	3	0	70,631	307	293	2	0	0	0	2	33	21
Michigan	8	4	0	1	3	0	21,906	404	479	0	0	0	0	0	150	135
Mississippi	3	0	0	0	3	0	30,752	318	408	3	0	0	0	3	107	149
Montana	1	1	0	0	0	0	8,410	214	171	0	0	0	0	0	102	82
Nebraska	22	12	0	0	10	0	96,600	583	490	9	0	0	0	9	276	205
New Mexico	28	7	0	16	5	0	133,080	1,017	1,062	1	0	0	0	1	172	167
West	18	1	0	16	1	0	100,356	452	348	1	0	0	0	1	56	39
East	10	6	0	0	4	0	32,724	565	714	0	0	0	0	0	116	128
North Dakota	0	0	0	0	0	0	0	153	176	0	0	0	0	0	40	46
Ohio	12	7	0	4	1	0	29,898	587	574	0	0	0	0	0	27	32
Oklahoma	91	42	3	9	28	9	372,180	3,389	2,329	8	0	0	3	5	344	442
Texas	257	150	5	22	72	8	1,133,135	8,399	9,201	46	5	2	1	38	1,738	1,904
Dist. 1	8	8	0	0	0	0	15,695	515	634	1	1	0	0	0	199	244
Dist. 2	7	0	0	5	2	0	32,065	457	439	0	0	0	0	0	117	106
Dist. 3	17	7	2	1	7	0	114,158	681	709	5	0	2	0	3	134	131
Dist. 4	17	3	1	1	12	0	105,300	716	621	9	0	0	0	9	165	179
East	27	17	1	2	7	0	158,622	721	732	4	0	0	0	4	174	154
Dist. 7-B	8	4	0	1	3	0	20,504	1,082	1,331	3	0	0	0	3	292	373
West	84	60	1	6	16	1	399,830	2,078	2,429	13	3	0	1	9	452	379
Dist. 9	66	40	0	0	19	7	169,369	1,455	1,706	8	1	0	0	7	151	299
Dist. 10	23	11	0	6	6	0	117,592	694	600	3	0	0	0	3	54	39
Utah	4	1	0	1	2	0	20,569	150	151	2	0	0	1	1	68	52
Wyoming	28	13	0	0	13	2	132,243	561	593	12	1	0	0	11	213	239
Miscellaneous	3	0	0	0	3	0	7,766	118	105	3	0	0	0	3	105	86
Total U. S.	873	371	14	83	268	137	3,338,980	26,449	25,007	138	11	2	7	118	5,103	5,530
Previous week	1,047	372	20	119	325	211	3,888,542	.....	.....	203	22	6	8	167	.....	.....
Cum. 1961	26,449	11,822	556	2,626	9,496	1,938	106,484,117	.....	.....	5,103	445	58	234	4,366	.....	.....
Cum. 1960	25,007	11,603	758	2,069	9,797	780	108,450,740	.....	.....	5,530	489	62	182	4,797	.....	.....
Western Canada	42	18	0	9	14	1	212,407	1,234	1,251	10	1	0	0	9	320	349

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	7-22-61	7-15-61	7-23-60
Pennsylvania	2,426	2,432	2,156
Other Appalachian	1,777	1,833	1,881
Illinois, Indiana, Michigan	10,924	10,806	9,300
Nebraska and North Dakota	3,235	3,268	2,922
Kansas	9,733	10,069	9,300
Oklahoma	17,268	16,761	17,210
Arkansas	2,013	2,249	1,923
Louisiana	21,642	21,525	17,535
North	3,765	3,854	2,886
South	17,877	17,671	14,649
Mississippi, Alabama, Florida	2,237	2,586	2,458
New Mexico	8,063	8,521	7,925
Texas	110,163	111,256	103,865
East Texas	9,472	9,237	8,157
West Texas	48,835	49,195	48,047
Texas Gulf	19,691	19,806	17,260
Other Texas	32,165	33,018	30,401
Wyoming	18,067	18,651	16,668
Other Rocky Mountain	10,430	10,444	9,916
California	23,578	23,923	28,120
Foreign	†15,191	14,519	13,737
Total	256,747	258,843	244,916

*Bureau of Mines. †Includes 4,314,000 bbl. in California.

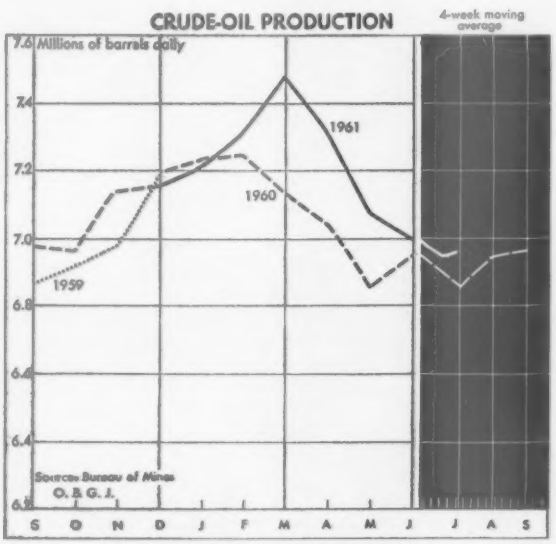
DAILY AVERAGE PRODUCTION FOR WEEK

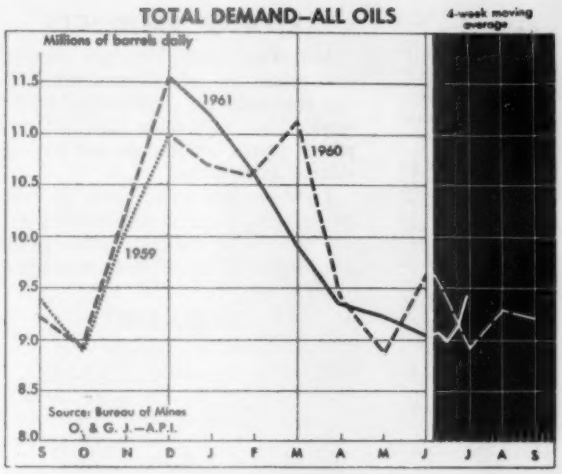
	July 29, 1961 Crude oil	Lease condensate	Total	July 22 total
Alabama	19,400	.....	19,400	19,375
Alaska	19,000	.....	19,000	19,200
Arkansas	78,000	100	78,100	73,500
California	817,800	.....	817,800	817,400
Colorado	128,200	.....	128,200	128,800
Eastern	40,800	.....	40,800	39,500
Florida	1,000	.....	1,000	1,000
Illinois	208,100	.....	208,100	208,200
Indiana	29,300	.....	29,300	29,000
Kansas	†302,275	.....	†302,275	†306,135
Kentucky	49,200	.....	49,200	48,800
Louisiana	993,300	132,150	1,125,450	1,125,325
North	106,300	5,150	111,450	111,325
South	887,000	127,000	1,014,000	1,014,000
Michigan	53,600	.....	53,600	53,700
Mississippi	146,900	3,600	150,500	150,500
Montana	85,800	.....	85,800	86,400
Nebraska	63,400	.....	63,400	65,900
Nevada	450	.....	450	450
New Mexico	295,000	7,100	302,100	302,100
North Dakota	55,000	.....	55,000	54,800
Oklahoma	‡509,000	.....	‡509,000	‡508,000
Texas	2,358,000	89,300	2,447,300	2,447,300
Dist. 1	42,000	2,600	44,600	44,600
Dist. 2	97,000	7,800	104,800	104,800
Dist. 3	302,500	37,000	339,500	339,500
Dist. 4	167,500	12,500	180,000	180,000
Dist. 5	27,000	600	27,600	27,600
Dist. 6	102,500	8,000	110,500	110,500
East Texas field	122,500	.....	122,500	122,500
Dist. 7-B	123,000	350	123,350	123,350
Dist. 7-C	111,000	3,150	114,150	114,150
Dist. 8	992,000	12,000	1,004,000	1,004,000
Dist. 9	166,000	3,500	169,500	169,500
Dist. 10	105,000	1,800	106,800	106,800
Utah	79,400	.....	79,400	81,000
Wyoming	398,300	.....	398,300	396,900
Others	‡675	.....	‡675	‡675
Total U. S.	6,731,900	232,250	6,964,150	6,963,960
Change from previous week, up			190	
Canada	†645,200	.....	†645,200	†656,200

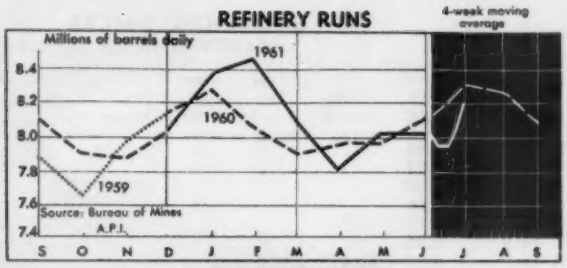
Total U. S. prod.—January 1-July 29 ..... 1,510,572,000 bbl.
Same period last year (crude plus cond.) ..... *1,485,606,000 bbl.

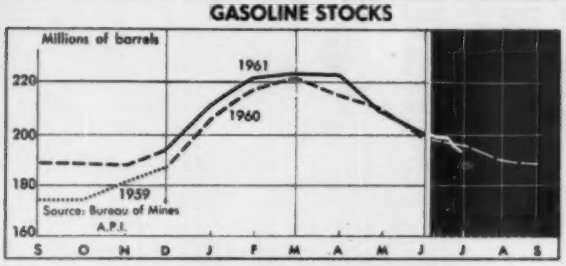
*Includes 48,207,600 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

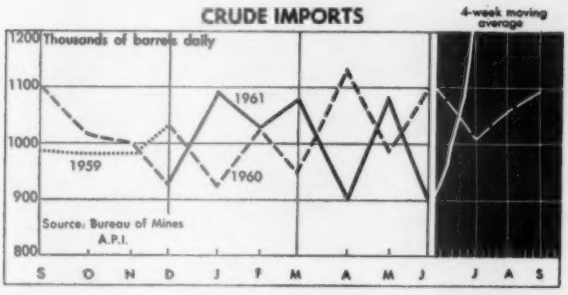
CRUDE-OIL PRODUCTION

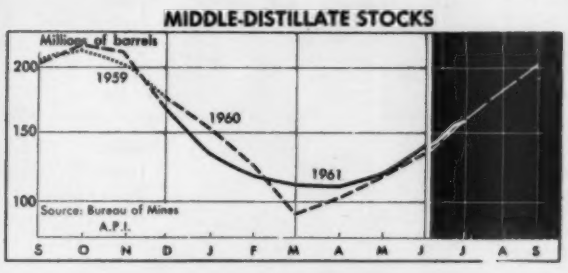


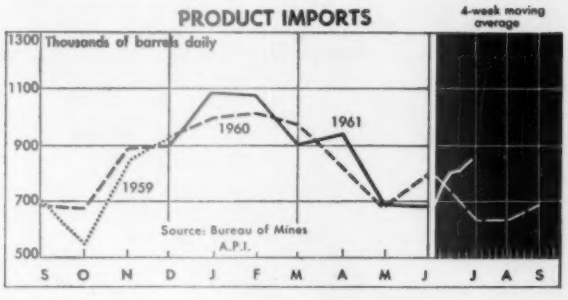


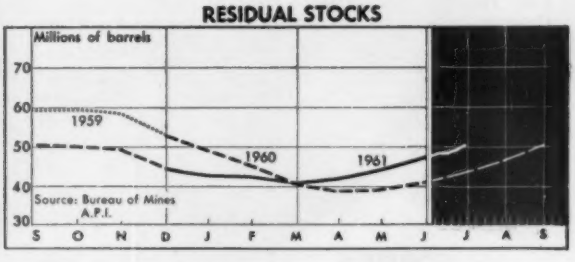












API REFINERY REPORT—JULY 28, 1961

(Thousands of barrels)

District—	Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, July 1960 — Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.
East Coast	1,091	511.7	26.7	323.6	141.6	45,411	11,078	40,918	12,647	1,190	541.5	41.9	350.8	157.3
Appalachian:														
District 1	70	28.0	3.4	15.7	4.3	5,382	645	2,772	437	92	40.5	2.4	20.7	7.1
District 2	107	62.3	4.3	23.6	9.6	2,795	401	1,191	305	108	56.8	2.7	21.1	9.1
Ind., Ill., Ky.	1,513	798.8	80.6	322.8	136.6	31,214	6,053	22,130	5,702	1,448	773.7	72.2	286.2	124.0
Minn., Wis., Dak.	132	61.9	5.9	30.6	16.4	7,054	1,375	6,042	751	127	59.0	4.3	32.5	15.0
Okla., Kans., Mo.	793	430.6	22.0	175.3	22.7	19,396	1,748	11,564	986	739	405.2	14.0	170.2	16.4
Inland Texas	328	222.6	11.6	47.0	23.6	7,328	611	1,699	2,668	309	231.5	7.2	53.4	20.1
Texas Gulf Coast	1,920	1,014.6	126.0	501.4	126.3	27,009	4,336	17,269	5,536	1,973	1,008.8	112.6	464.7	134.1
La. Gulf Coast	739	374.4	63.1	172.9	42.4	10,329	2,533	5,840	1,334	672	382.9	58.7	147.1	45.0
N. La. and Ark.	117	67.0	1.7	28.9	6.8	6,324	779	1,795	151	107	61.3	5.4	20.4	5.3
Rocky Mountain:														
New Mexico	19	11.4	0.6	3.1	2.0	613	42	175	43	26	13.7	0.3	4.9	2.4
Other Rocky Mt.	311	145.9	0.6	59.0	34.9	6,475	524	2,762	1,105	315	145.6	4.3	65.8	31.6
West Coast	1,257	620.7	43.8	183.8	253.1	26,180	1,739	15,133	18,561	1,201	522.1	34.1	193.6	279.9
July 28, 1961	8,397	4,349.9	390.3	1,887.7	820.3	193,510	31,864	129,290	50,226	8,307	4,242.6	360.1	1,831.4	847.3
July 21, 1961	8,284	4,401.7	399.3	1,917.6	810.4	196,455	30,720	124,717	49,859	.....	.....	.....	.....	.....
July 29, 1960	8,290	4,144.9	346.3	1,862.0	799.7	193,195	29,797	128,941	43,386	.....	.....	.....	.....	.....

*At refineries including natural blended †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

CRUDE-OIL PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Jules-burg	Wyo. (sour)
14.14.9	$1.86	....	....	....	....	....	....	....	....
15-15.9	1.93	....	....	....	....	....	....	....	$1.81
16-16.9	2.00	....	....	....	....	....	....	....	1.86
17-17.9	2.06	....	....	....	....	....	....	....	1.91
18-18.9	2.13	....	....	....	....	....	....	....	1.96
19-19.9	2.20	....	(†)	....	....	....	....	....	2.01
20-20.9	2.27	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	.281	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33-9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague. †Two buyers announced increase.

FLAT PRICES

Louisiana:
- Sweet Lake $3.00

Texas:
- East Texas 3.05-3.25
- Conroe 3.23-3.53
- Van 3.08

Pennsylvania Grade:
- Bradford $4.80
- Middle District 4.52
- Southwest Pennsylvania 4.25
- West Virginia 4.17
- Breckenridge 4.0

Illinois Basin **3.00-3.05**

FOREIGN

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)
- Arabian, 34.0°-34.9°, Ras Tanura $1.80
- Iranian, 34.0°-34.9°, Bandar Mashur 1.78
- Iranian, 34.0°-34.9°, Abadan 1.73
- Iraq, 35.0°-35.9°, Fao
- Kuwait, 31.0°-31.9°, Mina-al-Ahmadi 1.59
- Qatar, 41.0°-41.9°, Umm said 1.95

Middle East, E. Mediterranean:
- Arabian, 34.0°-34.9°, Sidon $2.17
- Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli 2.19

Far East (cargoes, f.o.b. Lutong, Sarawak):
- Seria Light, 36° 2.42

Canada:
- Leduc-Woodbend $2.53
- Redwater (Alta.) 2.42
- Weyburn (light) 2.085
- Midale C 1.71

Venezuela:
- Cumarebo, 47°-47.9°, Tucupido 3.34
- San Joaqin, 40°-40.9°, Puerto La Cruz 3.08
- Oficina, 35°-35.9°, Puerto La Cruz 2.80
- Tia Juana medium, 26°-26.9°, Amuay* 2.30
- Quiriquire, 16.0°-16.4°, Caripito 2.10
- Lagunillas heavy, flat, Las Piedras* 2.10
- Bachaquero, flat, 15°-16°, Las Piedras* 1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

TANKER RATES (Long Ton)

(Latest reported spot fixtures)
- ★ Gulf-NY, dirty (ATRS+10%) $3.14
- ★ Carib.-NY, Clean (ATRS−37.5%) 1.72
- ★ Carib.-UK, clean (Scale−40%) (19s. 6d.) .. 2.67
- PG-NY, dirty (USMC−67.5%) 4.13
- ★ PG-Japan, dirty (USMC−72.5%) 2.81

★ Denotes change from previous week.

REFINED PRODUCTS

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless other wise listed.

GASOLINE*

Mid-Continent (Group 3):
- ★ Regular (91 octane) 11.50-11.75
- ★ Premium (99 octane) 14.25-14.50
- Natural gasoline (26-70) 4.5
- Breckenridge 4.0

Gulf Coast (cargoes for coastwise or export movements):
- Regular (90 octane).. 10.75-11.00
- Regular (92 octane).. 11.00-11.25
- Premium (98 octane) 12.00-12.25

California (rack) Los Angeles:
- Regular (90 octane) 11.60
- Premium (94 octane) 12.60
- Premium (100 octane) 14.10

Caribbean area (cargoes):
- ★ Regular (87 octane) 8.875
- ★ Premium (97 octane) 11.125

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):
- Kerosine 42-44 ..... 9.50-9.75
- Diesel oil (58 d.i. and above) 9.00-9.25
- Distillate No. 1 ..... 9.00-9.25
- Distillate No. 2 ..... 8.25-8.50

Gulf Coast (cargoes):
- ★ Kerosine 41-43 ..... 9.50
- Distillate No. 2 ..... 8.50

New York Harbor (barges):
- Kerosine 42-43 ..... 11.20
- Distillate No. 2 ..... 10.20
- Diesel fuel, 48-52 d.i. 10.35

Caribbean area (cargoes):
- Distillate No. 2 ..... 8.25

RESIDUAL FUEL

Mid-Continent (Group 3):
- Residual fuel (max. 1% S) $1.65-1.75

Gulf Coast (cargoes):
- Bunker C fuel 2.20-2.30

New York Harbor (barges):
- Bunker C fuel 2.52

Caribbean (cargoes):
- Bunker C fuel 2.00

California (rack):
- Bunker C fuel, Los Angeles 2.25

This is Mister Right-On-Time

Flight Captain Ted Raines—like all Braniff pilots—shares an exceptional reputation for punctuality. Braniff, as government statistics prove, is a leader in on-time records.

"On-timeliness" is just one of many Braniff bonuses. Consider, for example, our Silver Service meals . . . the "looked-after" feeling you get from charming Braniff hostesses . . . and all the other friendly Braniff folks who serve you from start to destination. Yes, and the luxury of Braniff's new El Dorado Super Jets.

Men in the oil and gas industries also appreciate our extensive schedule of jet flights between Texas and New York, Chicago, Denver, and Mexico. Actually, Braniff serves 50 U.S. cities, and from Texas or New York/Miami (via Braniff-Eastern thru-jet service), 10 Latin American countries.

Next time you're off on a business or pleasure trip, fly the airline that promises a friendly lift with every flight.

BRANIFF *International* AIRWAYS

Classified Advertising

. . . your market place for the oil and gas industry

RATES:

- UNDISPLAYED CLASSIFIED: 30c a word per issue. 10% discount for three or more consecutive issues. $5.00 minimum charge. Blind box in our care count nine extra words. Not subject agency commission.
- DISPLAYED CLASSIFIED $20 a column inch one issue. 10% discount three or more consecutive issues. Minimum size one inch Subject to agency commission.
- All classified payable in advance.
- DEADLINE: Copy to reach The Oil and Gas Journal not later than 9 a.m. on Wednesday preceding date of publication. Send advertisments to: Classified Advertising Manager, THE OIL AND GAS JOURNAL, P. O. Box 1260, Tulsa 1, Oklahoma.

EXCEPT . . .

WESTERN STATES: (California, Washington, Oregon, Idaho, Nevada, Utah, and Arizona). Write: Classified Departments, Inc., The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif. Phone AXminister 2-0287. Copy deadline Monday noon.

FOR SALE EQUIPMENT

RIG MODEL 2000 Mayhew, Tandem trailer mounted, 8' x 12' steel tool house, separate skid-mounted mud pump with 140 GK Waukehsa engine complete with light plant. Drill collar, drill pipe etc., with 5 ton White truck and Tandem semi-trailer. Lundquist Pipe and Supply Company. LU 5-8850, Tulsa, Oklahoma.

LIQUIDATION

at TORRANCE, CAL.

CAT REFORMER NEW 1954

To be Sold Piecemeal at Tremendous Savings

MUST BE OUT IN ~~120~~ 90 DAYS

13'x112'6"x-5/16" TOWER, 250 PSI @ 650°F
23 Bubble Cap Trays
12'6"x98'x1½" REACTOR, 218 PSI @ 850°F
13'5"x19'6"x½" HOPPER
16'x150' CATALYST STORAGE BINS (3)
7'x44'6"x1 1/16" DRUM 255 PSI @ 650°F
9'x13'6"x1" DRUM baffled 174 PSI @ 375°F
48"x11'x13/16" DRUM 375 PSI
5'x29'x7/16" DRUM 100 PSI @ 650°F
5'x17'8"x5/16" DRUM
12' PRESSURE SPHERE 220 PSI @ 850°F
12' PRESSURE SPHERE 330 PSI @ 650°F
5' ODx17'6" OA AIR HEATER
197 Sq. ft. Petro-Chem INERT GAS GENERATOR
Compressed GAS DRYER Kemp Model 505
400 Sq. ft. U.S. Auto-Jet FILTERS (2)
26"x69" ENTRAINMENT SEPARATOR 600 PSI
2'4"x19'5"x3/4" ELUTRIATOR

HEAT EXCHANGERS—600 to 4250 Sq. Ft.
Chrome, Admiralty, Street Tubes
100 to 1000 PSI

PUMPS

1800GPM @ 141' Pacific 8" Type DC 100 HP (2)
506GPM @311' Pacific 4" Type SVS
450GPM @ 1160' Pacific 3" Type J 3 Stg (4)

COMPRESSORS

4840 CFM Carrier, Centrifugal 8100 RPM, 149.7 PSIA Suction, 239.7 PSIA Discharge Driven by 2066 HP Terry Condensing Turbine, 430 PSI @ 560°F. (2 Units)
604 Ton Carrier, Freon 11 Refrigeration with Condenser & Cooler driven by 639 HP Terry Condensing Turbine, 430 PSI.

Write for Inventory
Send Us Your Requirements

HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N. Y.
310 Thompson Bldg., Tulsa, Okla.

FOR SALE EQUIPMENT

1—FOUR-WHEEL lowboy trailer, new tires, size 1100 x 15—20 ply, has 4 height adjustments, lowest 7" above ground. $600.00. Phone FL 6-2757, Box 7058, Amarillo, Texas.

AN INVESTMENT! Productive advertising is an investment rather than an expenditure. Experienced oil men have found that The Oil and Gas Journal is their best classified advertising medium.

AT N. LITTLE ROCK, ARKANSAS

3—Worthington #LTC-4 compressors, 3500 CFM @ 45 PSI, 24 x 15, 2-cyl., 500 HP, 4-cycle. gas-engine drive.

Phone POplar 3-3505

PERRY EQUIPMENT CORP.
1402 N. Sixth St.
Philadelphia 22, Pa.

Good Workover & Servicing Equipment

1. Franks 658 double drum truck service unit—13 x 10 mast—IHC tandem truck—service 6,500'—12,000' —Powell, Wyoming
2. Cooper 420-36 double drum trailer rig Waukesha 145—GZBU engine—converter drive—90' two pole mast with racking board—drill to 4,500'—service to 10,000' —Lumberton, Mississippi
3. Wilson Super double drum winch—Waukesha GKU LPG engine-two pole mast—On IHC tandem truck—service to 6,000' —Odessa, Texas
4. Wichtex C-60 double drum winch—Waukesha 6MZA gas-gasoline engine—10 x 8 single pole mast—On IHC tandem truck—Service to 5,000' —Tulsa, Oklahoma
5. Cooper G-149 single drum winch—Allis-Chalmers engine—single pole mast—On Chevrolet truck—Service to 2,500' —Tulsa, Oklahoma
6. Cooper D-14 double drum winch tractor—rubber tired—Power steering—8 x 7 single pole mast—Service to 3,000' —Olney, Illinois
7. Cooper 50' 100,000# stiff derrick— Unmounted—hydraulic raising system—Suitable for tongs —New Iberia, La.
8. Other machines at Houston, Corpus Christi, Tulsa, Montana.
9. Miscellaneous: Wheatley 5 x 10 mud pump and mud tanks, Natchez—Workover pumps Edmonton Canada—Drilling, Tubing and Rod tools.

FRED E. COOPER, INC. P. O. BOX 1890 TULSA, OKLAHOMA—PHONE: LU 2-2194

LOCATED HOUSTON, TEXAS

(from Amoco Refinery Co., Destrehan, La.)

HEAT EXCHANGERS
900 to 3,500 sq. ft.
VESSELS—TOWERS
12" to 8' dia.
PETRO-CHEM FURNACES
½MM, ¾MM—1¼MM B.t.u./Hr.
PUMPS
50 to 7,000 GPM

—WIRE—PHONE—WRITE—

BRILL EQUIPMENT COMPANY
4101 SAN JACINTO ST., HOUSTON 4, TEXAS
35—65 JABEZ STREET, NEWARK 5, N. J.

FOR SALE EQUIPMENT

FAILING 1500 GOOD machine also pulling unit, and Vermeer trencher in east Kansas. J. E. Newton, 238 South Elm Ave. Webster Groves, Missouri.

20 H.P. TEXSTEAM Portable Steamer, 300 lbs., W.P., 550 gal. water capacity, mounted on 1960 International Harvester Truck 1109 Crane Road, Pampa, Texas. Phone MO 5-5870.

2—Frac Pumpers w/twin pumps, twin motors 300 HP each, w/4" or 4½" x 8" triplex heavy duty pumps, tanks and HP connections: 3—15 bbl. per minute sand proportioners: 2—400 bag sand transports. Selling price based on 50% of acquisition cost. Terms or lease/purchase for qualified buyers. Write or call C. D. Core, P. O. Box 47, Phone FR 9-5132, Seguin, Texas.

LIQUIDATION

at ESSO REFINERY Balto., Md.

MOST EQUIPMENT NEW 1956

TOWERS—30" to 84" diameter, 20' to 97' high, 7 to 34 trays, up to 360 PSI
DRUMS—3' to 12' diameter, 12' to 45' long to 530 PSI, some lined—some NEW
PETRO-CHEM FURNACES—30.7; 19.3; 10.4; 9.7; 7.5 MM BTU/Hr.
NEW FURNACE TUBES—4000'—3/8" & ½" Wall Croloy 5—4" to 6"
PUMPS—88 to 400 GPM up to 2040' head—up to 8 Stage

HEAT EXCHANGERS—CONDENSERS

Stainless Tubes —235 to 2320 Sq. Ft.
Croloy 5 Tubes —573 to 1040 Sq. Ft.
Admiralty Tubes —216 to 1640 Sq. Ft.
Steel Tubes —238 to 2240 Sq. Ft.

COMPRESSORS & BLOWERS

7500CFM @ 42.5PSIG, 1250HP Synch.
129CFM @ 193PSIA Worth. HB 7½x9

LARGE QUANTITY TRANSFORMERS & MOTORS

WRITE FOR CATALOG

HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N. Y.
310 Thompson Bldg., Tulsa, Okla.
Boston & Haven St., Baltimore 24, Md.

FOR SALE EQUIPMENT

1—HYSTER STRADDLE buggy, lifts 18,000# and straddles a stack of material 6' high by 5'8" wide. In excellent condition. $2800.00. Phone FL 6-2757, Box 7058, Amarillo, Texas.

U-15, 3 MOTORS, 131' Lee C. Moore Mast, 8,500' to 9,000' capacity complete rig, write for inventory. Also, 127' Lee C. Moore Mast Ser#T801, w/7' Substructure, steel of flooring, 7¼ x 14 Oilwell Pump, 7¼ x 10 Gardner-Denver Standby Pump. 9141¼ S.E. 29th, Box 4785, Okla City Telephone: OR 7-4541 or WI 3-3035.

FOR SALE Two U-15s, excellent condition, complete in every detail. Inventory and price on request. Box M-492, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Perforating Trucks with Logging Equipment. Will Sacrifice! All Offers Considered. Box M-467, The Oil and Gas Journal, Tulsa, Oklahoma.

28L EXCELLENT condition. Portable and completely and fully equipped with all tools. Call Bill Roberts, Glasglow, Ky. telephone OL 1-3850.

FOR SALE: One Cooper double drum model W servicing machine. 3 sheave 50 ft. single pole 8⅝ x 7 mast, Jerkline spudder, 4,000 ft. ⅝" wire line, mounted on 1954 Chevrolet tandem truck, with tool boxes. Machine and truck in very good condition. Award Pursley, Le Roy, W. Va. Phone Ravenswood, W. Va., BR 3-4005.

6" DRESSER COUPLINGS
Style #40, 24" Long, for Steel Pipe.
Complete with Gasoline Resistant Gaskets.
Unused Surplus $10.75, Regular $31.50
OILFIELD EQUIPMENT COMPANY
430 W. Seymour Avenue, Cincinnati 16, Ohio
Phone: VAlley 1-5582

(8) 96,000 Bbl. 120'x48'
WELDED CONE ROOF
OIL STORAGE TANKS
INSTALLED NEW in 1952
Dismantled, Matchmarked For
Reerection $75.00 N.T.
FOB Baltimore, Md.
HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N.Y.
Boston & Haven Sts., Baltimore 24, Md.

FOR SALE
Ingersoll-Rand Type 4XVG-2 gas engine driven compressor, shop-overhauled, 150 BHP, 350 RPM; 9¼" x 12" Cyl.—250# MWP, 5½" x 12" Cyl.—1000# MWP.
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Ph. 425-5497

FOR SALE EQUIPMENT

FOR SALE—Two Walker-Neer rigs and miscellaneous cable drilling tools. Contact E. E. Reed Drilling Company, P. O. Box 306, Phone Niagara 9-3451, Satanta, Kansas.

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HELP WANTED

CONSTRUCTION SUPERVISOR for Mexican project. Prefer Mechanical Engineer with substantial background all phases plant construction. Box M-515, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL JOB DIRECTORY, foreign and domestic, showing where to apply for jobs. $5.00 cash OIML Co., Box 2603, Tulsa, Oklahoma.

NATURAL GAS Engineer with engineering degree plus 3 to 5 years experince in plant design or operation for work in the Gulf Coast Area. Amerada Petroleum Corp., Gas Department, P. O. Box 2040, Tulsa, Oklahoma.

MECHANICAL ENGINEER, experienced in manufacturing and oil field production methods and equipment, for field and office work in Engineering Department of old, well known, oil field equipment manufacturer. Must be around 30-35 years of age. Excellent opportunity. Box M-502, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED: Process engineer, experienced in Alkylation, Cat-Reforming, Cat-Cracking and General Refining Processes. Refinery Located in Midwest. Reply: Box M-508, The Oil and Gas Journal, Tulsa, Oklahoma.

Medium-size integrated oil company located in Texas has openings for two experienced professional engineers as outlined below. All replies confidential. Submit complete resume with salary requirement and references. All replies will be acknowledged.

PROCESS ENGINEER
Graduate chemical engineer with two to four years experience in refinery and/or petrochemical operations.

STAFF MECHANICAL ENGINEER
Graduate mechanical engineer with six to ten years experience in refineries and related facilities. Experience must be broad to cover all phases of engineering from initial design to supervision of construction.

Box M-503, The Oil and Gas Journal
Tulsa, Oklahoma

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Box M-510
The Oil and Gas Journal
Tulsa, Oklahoma

SITUATIONS WANTED

GRADUATE Geologist-Geophysicist specializing in Southwest Texas desires affiliation for independent preferably on percentage basis. Box M-512, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND MANAGER, LLB Degree, 10 years' experience, 6 with Major, 4 as Manager for Independent. Qualified to manage small oil company or division, specialize in well deals. Experienced Gulf Coast, Mid-Continent, Rocky Mountains, Alaska, some foreign. F. C. Nance, FL 2-7107, 3605 Duchess Trail, Dallas, Texas.

YOUNG GEOLOGIST, 23, Completing Master's thesis. Straight A record Graduate School. Refinery and offshore roustabout experience. Interested in domestic or foreign employment. Resume sent on request. Box M-514, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, NINE YEARS experience South Texas and Texas upper gulf coast, proven ability to find structures that produce, desires position with aggressive company or independent, or retainer. Box M-509, The Oil and Gas Journal, Tulsa, Oklahoma.

PRACTICAL ENGINEER experienced in drilling, completions, workover jobs, repressuring and/or secondary recovery. Box M-506, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST-SEISMIC, gravity and magnetics interpreter. Only career opportunity considered. Relocate anywhere with family housing and schools. Mutual confidence expected of inquiry. Contact P. O. Box 3321, Bellaire, Texas.

CORROSION ENGINEER, BEE, Age 35. 12 yrs. experience in Oil, Mining, and Consulting Engineering Operations. Desire supervisory position with growth potential. Resume on request. Box M-505, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF ACCOUNTANT 41, B. S., Family. 12 years experience, Natural Gasoline, Refinery—all accounting problems, yield accounting, cost, budgets, contracts, personnel, office management. Box M-511, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—An employer with growth possibilities to hire 33 year old Mechanical Engineer with over 14 years graduate experience in refineries, foreign and domestic. Family. Returning from overseas August to relocate anywhere U. S. Sales work considered. Resume on request. Box M-494, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION FOREMAN: Married, Age 32. 10 years experience in all phases of petroleum production. Desire position with independent oil operator. Will relocate. References furnished upon request. Contact Wm. Bennett, 208 Mid-America Bldg., Midland, Texas. Phone MU 4-5523.

DRILLING OR PETROLEUM engineer: 11 years varied domestic and foreign experience in engineering, as a toolpusher and supervisor. Two degrees in engineering. Speak fluent Spanish. Desire domestic or foreign employment. Box M-499, The Oil and Gas Journal, Tulsa, Oklahoma.

PALEONTOLOGIST, 44 single, desires overseas position with oil company. 15 years experience with Tertiary and Cretaceous Foraminifera, and ammonites, in California, Colombia and Libya. Some field and wellsite work. Knows Spanish, learning Arabic. Box M-465, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS SERVICE

DELAWARE CORPORATION formed and serviced American Guaranty & Trust Company. P. O. Box 487, Wilmington, Delaware.

MONEY RAISING

SEMI-PROVEN drilling deal. Need associates. Three sands under 800 feet. Kempf, Box 235, Wagoner, Okla.

INDEPENDENT Production company desires venture capital for expansion. Good set-up for large corporation to expand into petroleum exploration or for individual seeking tax outlet. Box M-489, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL MAPS

PROPERTY LINE maps covering townships in northwestern Pennsylvania for sale. Clarion Development Company, 3201 Peach Street, Erie, Pennsylvania

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FOR SALE—One fourth Landowner's Royalty—57 Acre and 76 Acre E. Esparsa Survey Hopkins County, Texas. Box 305, Lebanon, Tennessee.

LEASE AND DRILLING BLOCKS

OWNER OF 130.60 acres federal oil and gas lease wishes to sell. T 26 S.R. 24 E. SLM, Grand County, Utah. Section 7: H.E.S. #207. M. V. Mack, 1304 Fortune Avenue, Panama City, Florida.

OVER 7,000 ACRES, good ten year commercial oil and gas leases for sale. Located in Northwest part of Ohio. Write to: Box M-504, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE FOR SALE: 6 active wells. Good production. Warren County, Kentucky. Write Box M-462, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND FOR LEASES; 60,000 acres Columbia Basin Wildcat area. 1 exploration well drilled—90 ft. of Odessa Sands T. D. 4,700 ft. Wire or write for complete report. C & D Minerals, Inc., 422 Paulsen Bldg., Spokane 1, Washington.

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PROSPECTIVE OIL LEASES: Am fee landowner over 2,000 acres near Pan American Petroleum Corporation No. 1 List, Sec. 23, Block 68, Township 1, T&P Survey, stratigraphic test, projected to 8,500 feet anticlinal axis nearby, Hudspeth County, Texas, leases available Hudspeth, Crane, Terrell Counties, Texas. Write landowner: Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

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being erected and will be owned and operated by Kerr-McGee Oil Industries Inc. To be ready this season. Located in Navajo, Apache County in T.20 N.R.26 E. State land 5 year leases in county only 25 cents an acre yearly rent. Free factual information. John L. Donahue 430-16th St., Denver 2, Colorado.

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LEADS FOR SALE of leases, interests, royalties, farmouts, investments. 1200 Independent Oil producers showing production figures. Oil Industry Mailing List, Tuloma Bldg., Tulsa, Okla.

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I CAN GET you choice producing royalties and over-rides. Reasonable prices. Contact Box M-513, The Oil and Gas Journal, Tulsa, Oklahoma.

U. S. FRANCHISES available—Down-Hole Casing Tester, field proven in over 1,000 jobs. Excellent profits for small investment—Write MACRO LIMITED, 534-6th Avenue S.W., Calgary, Alberta, Canada. Telephone: AMherst 2-9288.

CAMBRIDGE ARCH Area, Central and Western Nebraska. Established Oil Producing Company seeks associate to develop lease blocks. Also some acreage offsetting production. Box M-496, The Oil and Gas Journal, Tulsa, Oklahoma.

ARE YOU SHORT ON FINANCES OR EXPERIENCED STAFF TO WATERFLOOD YOUR STRIPPER PROPERTY?
Our company has the necessary qualifications and will join you as a part-interest partner, and will install and operate the flood. Interested parties please write: Box M-497, The Oil and Gas Journal, Tulsa, Oklahoma.

WE, TOO, believe that oil is only where you find it but we also believe that the most overlooked shallow play in Illinois is in the western part of the State. New shallow fields produce from 650 feet and above. For information concerning leases and drilling blocks write Petrolini Corporation, P. O. Box 89, Mt. Sterling, Illinois.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Denver, Colorado. Notice is hereby given that 296.77 acres of land in five parcels within the known geologic structure of the Bar-X Field, Mesa County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre. Sealed bids must be received in the Land Office before 3:00 P.M., September 25, 1961. Bids will be opened at 2:00 P.M., MST, September 27, 1961. Details of the lease offering, how and where to submit bids, and forms, may be obtained from the Bureau's Land Office, P. O. Box 1018, Denver 1, Colorado. Dale R. Andrus, Land Office Manager.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Indian Affairs, Uintah and Ouray Agency, Fort Duchesne, Utah. Sealed bids will be received until 2:00 P.M. Mountain Standard Time, September 6, 1961, and opened at that time in the office of the Uintah and Ouray Agency, Fort Duchesne, for the leasing of 29,681.81 acres of tribal Indian lands and 979.2 acres of allotted Indian lands, in Townships 3 and 4 South, Ranges 3, 4, and 5 West, Uinta meridian, Duchesne County, Utah, for oil and gas mining purposes. Details of the lease opening and how and where to file bids may be obtained by addressing an inquiry to the Superintendent, Uintah and Ouray Indian Agency, Fort Duchesne, Utah.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, 215 West Seventh Street, Los Angeles, California. Notice is hereby given that approximately 48.44 acres of land within the known geologic structure of the Tapia Field, California, will be offered for competitive oil and gas leasing through sealed bids to the qualified bidder of the highest cash amount per acre at 1:00 p.m., October 2, 1961, when bids will be opened. Full details of the lease offering, and how and where to submit bids, may be obtained from the Manager, Land Office, Bureau of Land Management, 215 West Seventh Street, Los Angeles, California. Signed Rolla E. Chandler, Manager, Land Office, Bureau of Land Management, Los Angeles, California.

(Continued from Page 76)

ceptions, showed increases of lesser degree. The exceptions were Tidewater, Richfield, and Continental.

Tidewater had a rough second quarter when earnings were knocked down badly by gasoline price wars in its West Coast marketing areas. Second-quarter earnings, for example, were only $3.7 million compared to $12.3 million in the same period in 1960. Richfield had similar trouble.

Tidewater President George F. Getty II said that otherwise good progress was made in company operations.

Operations . . . Eight companies reported cutbacks in refinery runs for the first half, and three had drops in liquids production.

Sharpest drop in refinery runs was made by Ohio Oil with a 9.6% decrease. Ohio Standard cut runs back 7.1%, Sun by 6.9%, and Sinclair by 6.6%. Others with lower runs were Phillips, Continental, Cities Service, and Atlantic Refining. Gulf reported a 2% drop in its domestic refining operations with all its throughput increases being made abroad.

In liquids production, only Shell, Continental, and Sunray Mid-Continent showed declines. Shell had a 10.5% drop, Sunray 11.5% and Continental 0.4%.

Canada . . . Early reports from Canadian companies give a mixed picture.

British American and Imperial showed slight decreases in first-half earnings from last year while Hudson's Bay achieved new records in nearly every phase of its business.

British American, however, explained that 1960 first-half earnings included $1.8 of non-recurring profits.

Imperial's earnings of $29 million were about 5% under those of 1960. The company maintained its production and sales volumes, but nonetheless earnings were hurt by lower product prices and inventory adjustments.

Hudson's Bay has a start on a big year. Earnings in the first half were $3 million compared with a net of only $615,000 last year. The company's liquid production increased 16.4% and sales of natural gas jumped 35.2%.

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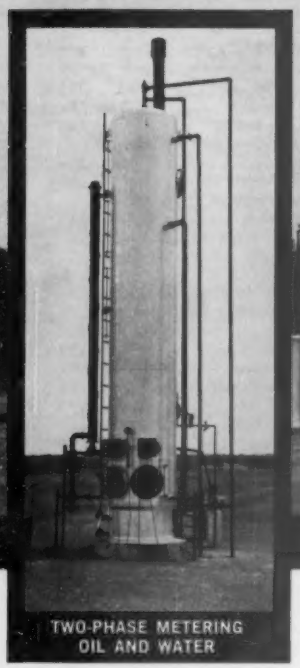

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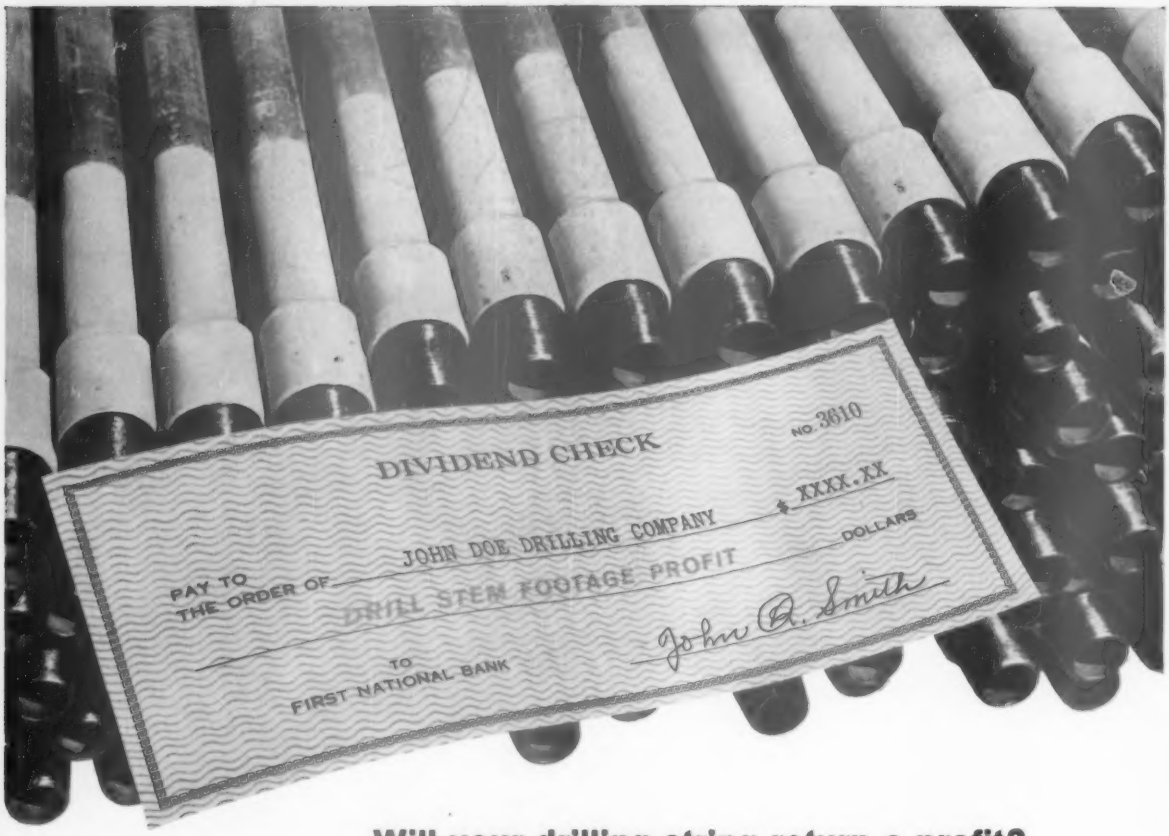

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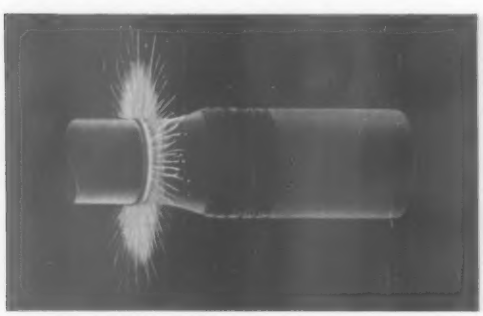

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